Jersey Central Railroad
Jersey City Ferry Terminal
Johnson Ave. at Hudson River
Jersey City
Hudson County
New Jersey

HAER No. NJ-27

PHOTOCRAPHS

WRITTEN HISTORICAL AND DESCRIPTIVE DATA

Historic American Engineering Record
National Park Service
Department of the Interior
Washington, D.C. 20240

HISTORIC AMERICAN ENGINEERING RECORD

NJ-27

Jersey Central Railroad Terminal

Date:	Original: 1889 Reconstruction: 1914
Location:	Johnson Ave. at Hudson River, Jersey City, Hudson Co. New Jersey.
Designed by:	Peabody & Stearns; Architect Central Railroad of N.J., Engineer
Owner:	Originally Central Railroad of New Jersey new line. At time of documentation, State of New Jersey, Dept. of Environmen- tal Protection.
Significance:	Jersey Central Terminal is of rare architectural type (railroad/maritime terminals) unique to only two areas of the United States. It was also one of only three mainland ports that received processed immigrants from Ellis Island. The station house is one of the remaining works of Peabody & Stearns, prominent East Coast architects in the late 19th century.
Transmitted by:	Daniel Clement, 1983, with historical data drawn from National Register of Historic Places file.

The Railroad/Maritime Complex, of which the Jersey Central Terminal is one, is an architectural type unique to San Francisco and the New York/New Jersey harbor. The building developed as a connection between the major mainland transport; the railroad, and its equal on the water; the ferry. The Jersey Central Terminal was just one of seven fully-developed railroad/maritime complexes that operated in New York harbor during the late 19th and 20th centuries. Built in 1889, and then modified in 1914, the Jersey Central Terminal was considered one of the finest, architecturally, of all the maritime terminals. The terminal complex consisted of a train shed and station house physically connected to the Ferry house and docks.

The first terminal was jointly designed by the engineering staff of the Central Railroad of New Jersey, and the architectural firm of Peabody and Stearns. The architects were responsible for the station house, while the engineering staff designed the train shed, ferry house, and wooden pile foundations. The station house, although rectangular in overall plan, was massed in the shape of a "T." The head of the "T" formed a back drop to the ferry slips, and the tail contained a waiting room that rose the full height of the building. Of note here, is the unique feature of a starburst decoration applied to the connections of the roof trusses in waiting room (see photos 7 and 8). The three-aisled train shed had a central aisle that clearly spanned 142 feet and was flanked by two smaller shed roofed appendages for a total width of 215 feet covering 12 tracks. The Ferry house was a one-story wooden structure containing four slips that terminated with special ferry docks which connected to the main ferry concourse.

Twenty five years after the first terminal was built, major reconstruction was undertaken. Two factors were responsible for this. The first was a major increase in traffic through the terminal. The second was the addition of a second deck to ferries that permitted loading and unloading from two decks and helped to minimize loading and unloading time. The old train shed was replaced by the new bush-type shed which covered 330,000sq. ft, over 9 aisles and 20 tracks, making it the largest ever built. The station house was not altered on the exterior and upper interior floors, but the ground floor's main waiting room and ticket office were moved to the north side of the building, being replaced by a general circulation space. A new upper ferry concourse was added, which connected to a completely rebuilt ferry house. The new ferry house was framed in steel with copper sheathing over the four ferry slips. A second story was added to provide direct access between the new upper concourses of the station house and the new upper decks of the ferries.

The terminal began a steady decline after WWI due to increased competition with other railroads and the completion the Lincoln and Holland tunnels and the George Washington Bridge. The station was closed in 1967 with the rerouting of the Jersey Central Railroad to Newark as part of a major rehabilitation of the Port Authority Trans Hudson Railroad (PATH). In 1978 permission was given to restore the Jersey Central Terminal as a multiple public use facility, as part of Liberty State Park.

Central Railroad of New Jersey,
Jersey City Ferry Terminal
Addendum to:
Jersey Central Railroad Terminal
Johnson Avenue at Hudson River
Jersey City
Hudson City
New Jersey

HAER No. NJ-27

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WRITTEN HISTORICAL AND DESCRIPTIVE DATA

Historic American Engineering Record
Mid-Atlantic Region
National Park Service
Department of the Interior
Philadelphia, Pennsylvania 19106

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HISTORIC AMERICAN ENGINEERING RECORD

Addendum to:

Central Railroad of New Jersey, Jersey City Ferry Terminal

HAER No. NJ-27

Location:	Johnson Avenue at Hudson River Jersey City, Hudson County, New Jersey UTM: 18.581480.4506480 Quad: Jersey City
Date of Construction:	1889; 1914 - remodeling included reconstruction of ferry sheds and concourse with two levels
Present Owner:	State of New Jersey Division of Parks and Forestry Department of Environmental Protection Trenton, New Jersey 08625
Present Use:	Terminal complex is part of Liberty State Park; ferry sheds and concourse are unrenovated and unused
Significance:	The ferry slips, sheds, and concourses comprise the harborside element of the Central Railroad of New Jersey, Jersey City Ferry Terminal, which is a National Register site. The terminal is the last vestige of the huge harborside railroad development of the Jersey City shoreline in the nineteenth and twentieth centuries.
Project Information:	Prior to renovation, the ferry sheds, ferry concourse and ferry slips were documented by Herbert L. Githens, historian, Historic Conservation and Interpretation, Inc., Box 111, RD 3, Newton, New Jersey 07860. Documentation was undertaken in March 1981.
Edited, Retyped and Transmitted by:	Jean P. Yearby, HAER, 1987

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1. New York Bay

The movement of railroad passengers on a regularly scheduled basis across large bodies of water in the United States seems to have been most highly developed in the New York and San Francisco bays In 1913, 40 million passengers were carried between San Francisco and Oakland, Alameda, Richmond, and Sausalito. The bulk of this traffic was handled by the Southern Pacific Railroad (Droege 1916: 137). Likewise, most of the New York ferry traffic was controlled by various railroad companies. To do so, they built railroad-ferry terminals along the west bank of the Hudson River in Hudson County, New Jersey. From 1838, this shoreline was dotted with a series of impressive buildings and structures which housed the transfer of passengers from one mode of transportation to another.

2. Communipaw, 1661

The first Hudson River ferry service was established in 1661 at Communipaw (Grundy 1976: 9) by a William Jansen. His operation ran from the end of Communipaw Avenue in Jersey City (now Liberty State Park) to the Battery in Manhattan. The boats utilized were periaugers, a Dutch adaptation of the Spanish or Portugese pirogue, a shallow-draft sailing ship (McLean 1895: 29; HCI 1977: 61). When carriages and wagons were transported, the horse and vehicle were separated and lifted into and out of the ferry (HCI 1977: 61).

3. Paulus Hook, 1764

The crude and time-consuming ferrying method just described was no doubt also utilized by the Paulus Hook ferry, which superseded Communipaw in 1864. Located at the end of Grand Street, this ferry became part of the stage route between New York and Philadelphia (Winfield 1891: 13-14; HCI 1977: 32).

4. Fulton's Steamboats, 1807-13

Advancements in the ferrying process awaited Robert Fulton's steamboat, the Clermont, in 1807 and its subsequent adaptation to ferry boats. The first steam-powered ferry, the Raritan, ran from the Battery in New York City to Perth Amboy and Elizabethport, New Jersey, in 1810 (Condit 1980: 14). In 1812, the first regularly

run ferry service began when the steam-powered Jersey connected the foot of Broadway in New York with Jersey City (Condit 1980: 46). Fulton, operating out of a foundry and drydock in Paulus Hook, constructed the Jersey and its sister ship, the York. Both steam ferries were operating in 1813, controlled by an association later known as the York and Jersey Steam Boat Company (Winfield 1874: 250; HCI 1977: 65). The best description of the Jersey is given by Fulton himself:

> She is built of two boats, each ten feet beam, eighty feet long and five feet deep in the hold; which boats are distant from each other ten feet, confined by strong transverse beam knees and diagonal traces forming a deck thirty feet wide and eighty feet long. The propelling waterwheel is placed between the boats to prevent it from injury from ice and shocks on entering or approaching the dock. The whole of the machinery being placed between the two boats, leaves ten feet on the deck of each boat for carriages, horses and cattle, etc., the other, having neat benches and covered with an awning, is for passengers, and there is also a passage and stairway to a neat cabin, which is fifty feet long and five feet clear from the floor to the beams, furnished with benches and provided with a stove in winter. Although the two boats and space between them give thirty feet beam, yet they present sharp bows to the water, and have only the resistance in the water of one boat of twenty feet beam. Both ends being alike, and each having a rudder, she never puts about. (Winfield 1874: 250-52).

Although the steamboat provided for better motive power than either oar or sail, the docking problems were the same for all types of ferry. Fulton invented the float bridge, which rose and fell with the tide, allowing the direct conveyance of teams and wheeled vehicles from a bulkhead to a ferry. John Stevens of Hoboken invented the "spring piling," which safely guided ferries into funnel-shaped slips (Condit 1980: 46-47).

5. Canals

Contemporaneous with these developments in the United States was the construction of canals.. The first was the Erie Canal, built between 1817 and 1825. The Morris Canal, a New Jersey enterprise, reached the Jersey City waterfront in 1836 but presented no threat to the ferry stagecoach service; the canal was built to haul Pennsylvania anthracite coal to the northern New Jersey iron works and, later, to the New York Harbor. It was the development of the

railroad and its subsequent interface with the ferry terminals of New York Harbor that brought further development of ferry docking facilities.

6. Camden and Amboy Railroad

In 1832, the Camden and Amboy Railroad and Transportation Company completed New Jersey's first line from South Amboy to Bordentown. In the same year, the Paterson and Hudson River Railroad Company opened horse-drawn service from Paterson to Passaic; in 1833, it was extended to Jersey City. As of 1834, the New Jersey Railroad and Transportation Company had also crossed the tidal marshlands to link Newark and Jersey City. However, all these lines stopped west of Jersey City's Bergen Hill, a prominent traprock ridge that still rises steeply along the Hudson River from the Palisades and dies at the Bayonne-Jersey City border. To terminate at the New Jersey waterfront, all railroad companies had to find ways to negotiate this igneous barrier, either by cutting or tunneling through it, or by circumventing it by means of a bridge over Newark Bay (Condit 1980: 10). Only such a large construction could relieve the railroads of the time-consuming intermediate exchange of passengers in stagecoaches from the west side of Bergen Hill to the waterfront.

7. The First Bergen Hill Cut and Waterfront Terminal, 1838

The first company to transverse Bergen Hill was the New Jersey Railroad and Transportation Company which, in 1838, cut through the rock at present Journal Square and built the first Jersey City waterfront passenger terminal at Montgomery and Hudson streets. In 1839, a bridge was completed over the Delaware River at Trenton, and direct service was established between Jersey City and Philadelphia. The future main line of the Pennsylvania Railroad was
thus in place, awaiting that company's consolidation of the smaller routes in 1867, and America's image of Jersey City as a terminal point was fixed:

> The ferry connection for the morning train left at the foot of Liberty Street at 9:00 A.M.; the train probably left the Jersey City terminal around 9:30 and arrived in Philadelphia at 2:00 P.M., allowing one half hour for the connection to the Baltimore train of the Philadelphia, Wilmington and Baltimore Railroad (Condit 1980: 48-49).

B. THE RAIL/FERRY PASSENGER TERMINAL: BUILDING TYPOLOGY

1. Spatial Components

Most railroad stations can be categorized as either through stations or terminals..Trains literally move through the former; in a terminal, trains reach the end of a long distance or commuter line and collectively take on or discharge passengers. A terminal necessitates the reverse movement of trains on the same track in the train shed. Within major cities, railroad terminal became important elements of urban design. Elaborate station or "head" houses were erected in the prevailing architectural modes, usually concealing the train sheds.

Each terminal consisted of three components: the train shed(s), the concourse, and the head house. The concourse provided a movement corridor normal to that of the platforms in the train shed. It also served as a transitional area between train shed and head house. The head house contained waiting room(s), comfort stations, ticket counters, newsstands, restaurants, etc., and usually railroad offices. Representative examples of this ensemble of spaces are the Union Station in Washington, D. C. (1907), South Station in Boston (1898), and Union Station in St. Louis (1894).

The waterfront rail/ferry terminal followed the form of the regular terminal station with the addition of a ferry concourse and ferry shed on the opposite side of the head house. Thus, the terminal became double ended, and the head house became linking element within the scheme. The concourses on both sides of the head house allowed for lateral movement of passengers and express baggage, as well as vehicles in the case of the ferry concourse. Not all passengers made the ferry-train connection at waterfront terminals. For those whose destination was the terminal, the concourse provided a route away from the major pedestrian movement along the longitudinal axis. The five major components of the rail/ferry waterfront passenger terminal are illustrated in Figure B.

Just as the train shed provided a covered loading and unloading area for trains, the ferry shed shielded a similar activity for the ferry boats. As in the train shed, one end wall was open to admit the ferry. The transfer or float bridge, a ramp that adjusted to the height of the boat, which rose and fell with the tide, made the transition from the bulkhead to the boat deck. Later, with the advent of two-story ferry boats, which accommodated vehicular and pedestrian traffic on lower and upper levels, respectively, a much larger and more elaborate ferry shed was

required, in which inclined ramps linked the train concourse directly to a second-level ferry concourse.

2. The NJRR&TC's First Jersey City Terminal, 1838

When the first railroad cut through Bergen Hill was completed in 1838, the New Jersey Railroad and Transportation Company (NJRR&TC) opened Jersey City's first rail/ferry terminal. The railroad company joined the Morris Canal on the waterfront, the canal having arrived at Jersey City in 1836. The location of the terminal was at the end of Montgomery Street on the Hudson River. Tracks ran diagonally through the grid of Paulus Hook, northwest along present Railroad Avenue (Columbus Drive). When it reached Bergen Hill, the line curved through the 40-foot open cut under Summit Avenue. On the west side of the hill, the line branched westward to Newark (NJRR&TC) and northward to Paterson (Paterson and Hudson River Railroad). (The Bergen Hill cut is still used today by PATH commuter trains.)

The site chosen for the terminal was formerly occupied by the Edge Windmill (1815), a five-story flour mill that had served as a distinct Jersey City landmark in the harbor. [This structure was taken apart and shipped first to Town Harbor, Long Island, and then to Mill Hill, Southold, where it was reassembled and operated successfully as the Great Western Flouring Mill until destroyed by fire in 1870 (Shaw 1884: 1156-57; HCI 1977: 68).] The old ferry landing site at Grand Street was removed in favor of the Montgomery Street location. In 1840, a stone bulkhead was built along the east side of Hudson Street.

The NJRR&TC rail/ferry terminal of 1838 consisted of two buildings and the ferry slip. Of the two buildings

> ... the smaller was a gabled brick enclosure with a kind of portico along one side, both backed against the ferry slip; the broader and lower of the two, which was built to house the trains, was another brick enclosure under a gable roof, its rear wall pierced by three arched openings to allow for the entry of tracks into the building. (Condit 1980: 48)

The simple form of the train shed was counterbalanced by the head house with its classical portico. The function of the portico, located on the north side of the house, is unclear.

Northwest of the terminal, the NJRR&TC built an engine terminal and freight house, probably off the north side of Mercer Street between Greene and Washington streets. The roundhouse consisted of nine bays with arched headed doors and a simple gable roof over a curving plan. East of the roundhouse was a two-story freight house. These facilities supported the through service from Jersey City to New Brunswick (NJRR&TC), which linked to Trenton (Camden and Amboy Railroad and Transportation Company) and Philadelphia (Philadelphia and Trenton Railroad).

3. Subsequent Terminals at Exchange Place

The strategic location of the NJRR&TC's Jersey City terminal along the eastern end of the New York-Philadelphia corridor guaranteed increases in passenger traffic. In 1853, the company petitioned the New Jersey legislature to be granted authority to own and operate its own boats and to build a new terminal. The petition was granted in 1854 and a new rail/ferry terminal was operable by 1858. The complex contained five tracks and four slips.

> [The head house] ... standing entirely on land, was of brick construction, but the ferry concourse and slips were built over the water in the common forms of braced piling and timber framing. The vaulted train shed roof was covered with corrugated galvanized iron that was undoubtedly supported on arched Howe trusses of timber, like those of the two earlier stations of the Philadelphia, Wilmington & Baltimore Railroad in Philadelphia (Condit, 1980: 49).

In 1860, the company operated ferries in each direction at 10-minute intervals from 5:00 A.M. to 10:00 P.M. and at 15-minute intervals over the nighttime hours (Condit 1980: 49).

The various railroad lines that comprised the Jersey City to Philadelphia corridor were consolidated by the directors of the Pennsylvania Railroad between 1852 and 1871, forming the United Railroads of New Jersey. During 1874 and 1876, another terminal was constructed at Jersey City, superseding the 1858 complex. Designed by Joseph Wilson of Philadelphia, this rail/ferry complex was more sophisticated than the earlier attempts.

In 1890, the Pennsylvania Railroad straightened the Bergen Hill cut and built an engine terminal and coach yard just east of the cut. Between 1890 and 1892, the entire line from Brunswick Street to the waterfront terminal was raised, partly on an iron-framed

viaduct. This work coincided with yet another passenger terminal's construction between 1888 and 1892. Charles Schneider's fantastic train shed, having a single span of 250 feet, was part of this restructuring. Five ferry sheds included double-level ferry boats to accommodate pedestrians on the second floor and vehicles below. The wooden houses of the ferry sheds were destroyed, along with part of the head house in an 1898 fire. All were rebuilt with steel and clad with copper sheathing.

Even after it tunneled under the Hudson River, used electric power, and constructed Penn Station in New York City between 1904 and 1910, the Pennsylvania Railroad maintained steam trains to its Jersey City terminal at Exchange Place. However, when the Northeast Corridor (Washington, D. C. to Boston) shifted north of Jersey City, the Pennsylvania Railroad developed through service to New York City, circumventing the ferry connection.

4. The Erie Terminal at Pavonia

In 1861, the Erie Railroad completed the first tunnel through the Bergen Hill in Jersey City and established a rail/ferry terminal at the end of Pavonia Avenue, from which ferries departed for Chambers Street in Manhattan. These facilities were greatly enhanced in 1886-88 by the construction of a new terminal designed by architect George Archer and Erie engineer C. W. Buchholz. The picturesque wood frame head house was abandoned in the Erie-Lackawanna merger of 1960.

5. The Morris and Essex/Delaware, Lackawanna & Western at Hoboken

The Morris and Essex Railroad began as a connection between Newark and towns west of that city in Morris County. Links between the waterfront and Newark were accomplished between 1859 and 1862 via the Erie tunnel and the Hoboken terminal site. The early terminal structures were replaced in 1879-80 by a major complex erected by the Delaware, Lackawanna and Western (DL&W) Railroad, which leased the Morris and Essex in 1868. These timber and iron-framed buildings and structures were destroyed by fire in 1905.

The great Beaux Arts terminal at Hoboken, still in operation today, was built between 1905 and 1907. Designs were by Kenneth Murchison, architect, and Lincoln Bush, DL&W engineer. The great head house, ferry concourse, and copper-sheathed ferry sheds represented the City Beautiful planning advances of the day, i.e., the terminal conceived as the gateway to cities. Lincoln

Bush's train shed design--which carries his name, "Bush shed"--was the first ever erected.

C. THE CRRNJ TERMINAL AT JERSEY CITY

1. Overview of the Jersey Central

Chartered in 1831, the Elizabeth and Somerville Railroad Company was the progenitor of the Central Railroad Company of New Jersey, which resulted from a consolidation of the former with the Somerville and Easton Railroad in 1847. This merger was completed in 1848, and the name formally changed in 1849. Its main line from Phillipsburg to Elizabeth was completed in 1852. Extension eastward from Elizabeth to tidewater at Jersey City was by way of the New Jersey Railroad and Transportation Company's track, as per an 1848 agreement.

However, the main terminal at Elizabethport on Newark Bay was too distant from the activity developing around New York Bay. The Jersey Central required a better location for delivering Pennsylvania anthracite and for servicing the predominantly New Jersey commuting clientele that was developing along the company's main line. The Jersey City/Hoboken waterfront was already monopolized by the New Jersey Railroad and Transportation Company (1838) at Exchange Place, the Erie (1861) at Pavonia, and the Delaware, Lackawanna and Western (1862) at Hoboken. All of these companies had reached tidewater by extensive and expensive cutting and tunneling through Bergen Hill.

2. The 1864 Jersey City Terminal

Facing such problems, the Jersey Central was granted a charter in 1860 to build a waterfront terminal on New York Harbor. The low mud flats of South (Communipaw) Cove, south of Paulus Hook at the foot of Communipaw Avenue, were chosen as the new site. Instead of bridging the Hackensack and Passaic rivers and then tunneling under Bergen Hill, the Jersey Central chose to bridge Newark Bay to Bayonne, crossing south of Bergen Hill and then following the shoreline of the New York Bay northward to the South Cove.

The bridge was a tremendous undertaking, spanning 9,714 feet overall. It consisted of double-tracked timber trestles leaving both shores on either side of a cast- and wrought-iron trussed swing bridge (Condit 1980: 66).

By contrast, the terminal was a far more modest effort. Placed upon extensive timber pilings that were driven into fill brought in primarily from Manhattan building excavations, the terminal consisted of two structures, both of wooden construction (see Figure C). A train shed received approximately nine tracks west of the head house that appears to have functioned as both concourse and ferry shed. From this point, the company operated ferries to Liberty Street in Manhattan. At the time of the erection of the 1889 terminal, this older complex was described as

> ... some very shabby wooden structures which have been in use ever since the opening of the road to Jersey City in 1864 (The Railroad Gazette 1889: 422).

The corresponding significant change in the Jersey City landscape was captured by local artist August Will. His two views of the harbor, dated 1861 and 1899, record the South Cove before and after the railroad's arrival (Sanford and McMahon 1976: 20-21). Correspondingly, as Jersey City expanded along with the railroads, its population grew from 6,856 in 1850 to 82,546 in 1870. By the turn of the century, this figure stood at 206,433.

3. The 1888-89 Terminal

The last decades of the nineteenth century witnessed the rapid rise of New Jersey's suburban towns, a growth spawned by railroad linkage to New York City. A typical example of this phenomenon was the main line of the Jersey Central's service to Elizabeth, Cranford, Plainfield, Bound Brook, Somerville, Whitehouse, Lebanon, Asbury, Bloomsbury, and Phillipsburg. Longer distance service was also available to Easton, Bethlehem, and Allentown in Pennsylvania.

The 1864 facilities quickly became inadequate and, in 1886, planning began for a new terminal. The company chose the prestigious architectural firm of Peabody and Stearns of Boston to design the buildings and give visual clarity to the entire terminal. Peabody and Stearns had already designed Boston's very successful Park Square Station of 1872-74. The architects worked within various eclectic modes, but were strongly influenced by Henry Hobson Richardson's work. French Renaissance in its exterior massing and details, internally the Jersey City terminal, exhibited the strength of the Romanesque, given a contemporary interpretation with tremendous iron trusses.

Structural design, track planning, and construction were supervised by William H. Peddle, chief engineer for the Jersey Central. The

general contractor was V. J. Hedder and Sons of New York, and the fabricator of the ironwork was the Phoenix Iron Company of Phoenixville, Pennsylvania. The largest station project of its time (Condit 1980: 142), it consisted of a ferry shed of four slips, a ferry concourse (all on one level), a head house, a train concourse, a train shed, a regraded yard, a new interlocking system and signal tower, and a powerhouse that provided steam and electricity. The total expenditure for this massive project was $500,000 (The Railroad Gazette 1889: 422). Work was begun in 1887 and completed in 1889. A new Newark Bay bridge was also part of this scheme, similar to the earlier span except that one center movable portion was a wrought-iron swing bridge (Condit 1980: 66).

The principal spatial components of the terminal were symmetrically arranged along an east-west axis (see Figure D). The train and ferry concourses were actually contiguous parts of the train and ferry sheds, respectively. The train shed and head house were of the same width and materials: brick masonry and iron trusses. The ferry portion was wider and constructed of wood. The two end ferry slips were placed outside and to either side of the end walls of the head house. The ferry concourse gave vehicular access to the one-story ferry bridges on a transverse axis. Simple, low-pitched gable roofs covered the ferry sheds and concourse. Between the slips were three spaces containing staff dining facilities, storage rooms, toilets, and an "emigrant waiting room" (see Figures D, E, and F). The ferry bridges, consisting of heavy timber construction with iron tie beams, were articulated in the common arrangement of two smaller aisles flanking a larger center lane. Vehicles and pedestrians loaded and embarked on the same adjustable bridge.

The handsome head house was disposed to handle the movement of passengers and baggage along the dominant east-west axis. To accomplish this function, the main waiting room was located at its center, linking the train and ferry concourses with the passenger comfort stations. This inspired three-and-one-half story space was the centroid of the complex. As designed and restored, it is a skylit, 64-by 96-foot, three-and-one-half story hall spanned by three great wrought iron trusses. The walls were all veneered with glazed cream-colored English brick. Iron balconies on the upper stories contained railroad company offices. The ground level was given over to passenger comforts: men's and women's waiting rooms, newsstands, fruit stands, lunch room, dining room, toilets, telegraph rooms, and ticket counter, which was then located along the west end of the great space. Passengers could

avoid crossing this busy place by way of passageways located at the north and south sides of the head house. The north passage, the narrower of the two, was the baggage passage (labeled "CC" in Figure D). The south passage (labeled "M" in Figure D) was wider and was clad in the same glazed brick as the main waiting room.

The waterfront facade was organized into a five-part plan of a large center pavilion linked to smaller pavilions at either end (see Figures E and F). Tall mansard roofs still crown these parts. The central portion is capped by a cupola, and the front face of the wall contained a magnificent Harvard clock with a glass face. The clock was placed where passengers on incoming and outgoing ferry boats could check the time over the low, single-story ferry houses. Semicircular-arch headed windows trimmed in sandstone marked the second floor across the entire length of the front facade and the third floor of the center pavilion. Dormers were incorporated into the third floor roof on either side. Each end pavilion contained one dormer, and three each were located in the roof areas between the center and end pavilions.

The train shed was of the gable type, using wrought-iron Pratt trusses spanning 142 feet, 4 inches and supported by cast-iron columns. Shed appendages to either side, spanning 36 feet, 4 inches, were carried by the cast-iron columns and masonry load-bearing walls along the north and south sides. The total width, similar to the head house, was 215 feet. Each truss was spaced 36 feet, 6 inches on center, yielding a total length of 512 feet in 14 spans. Twelve tracks, six inbound and six outbound, entered the shed. A continuous clerestory ran along the space between the top of the shed roofs and the ends of the center span. A continuous monitor, constructed entirely of glass and steel bars ("Helliwell Roof"), ran along the ridge of the center span (The Railroad Gazette 1889: 422). The outer curtain wall on the west end was entirely glazed, which was highly praised at the time:

> The noticeable characteristic of the train shed is its very light and cheerful appearance, in which it is an advance on anything we have seen in this country (The Railroad Gazette 1889: 422).

Artificial illumination was another notable feature of the 1889 terminal. Electrical lighting was installed throughout the spaces. The company erected a power plant north of the terminal to supply electricity and steam for heating both the terminal and passenger cars. Four Babcock and Wilcox boilers and four Edison dynamos were housed within the plant.

At Pavonia in Jersey City, the Erie Railroad had erected a train shed similar to the Jersey Central's shed in 1886-88; it may have served as a model for the Jersey Central engineers. In any case, the Jersey City train shed was the largest shed of the gable type ever erected (Condit 1986: 132-33). It was also one of the last of its type. The Pennsylvania Railroad, in its 1888-92 Exchange Place Terminal, constructed a single-span, three-hinged arch train shed, covering 250 feet. This type, in turn, was made obsolete by the Bush shed, invented by Lincoln Bush for the 1905-07 Delaware, Lackawanna & Western Terminal in Hoboken.

The Jersey Central installed a new interlocking system in its yard. Built by Union Switch and Signal Company, it consisted of levers operated by tower men and lever men governed by overhead semaphores. Placed in operation, the system was an immediate failure, owing to poor training of engineers and yard men. Reworking the whole apparatus between 1889 and 1890, the company installed a pioneer system of automatic block signaling between the terminal and Bayonne, manufactured by Westinghouse Electric and Manufacturing Company. Carl Condit, in The Port of New York, states that

> There was abundant evidence that the Central Railroad of New Jersey stood in the front rank of technical innovation in the last decade of the century (Condit 1980: 147).

In 1891, the Jersey Central ran 266 trains per weekday in and out of its new terminal. Along with its busy passenger service, it operated extensive freight and especially coal float operations south of the Communipaw terminal. Pennsylvania anthracite transversed the bay alongside the passenger ferries. The marine terminal complex represented the greatest concentration of rail facilities in the New York Harbor area at the turn of the century (Condit 1980: 149-50).

4. The 1912-14 Remodeling and Expansion

In 1900, the Jersey Central began to expand its South Cove operations by dredging and filling the flats south of its terminal. A bulkhead was established by sinking old canal barges filled with stones. Behind the canal boats, an earthen dike was made, using fill from cellar excavations (Engineering News 1914: 1216). Recent test excavations have revealed that a significant amount of domestic garbage and coal cinders were also used as fill (Rutsch and Githens 1980). Eventually, covered freight piers were built out from this new bulkhead.

In New York, the ferry docks of the railroad companies that operated passenger service across the harbor were located south of Christopher Street (except the West Shore Railroad, which ran to 42nd Street). With Manhattan's continued development northward, and in an unusual cooperative venture, the Jersey Central, Erie, and Lackawanna collaborated to build a new ferry terminal at West 23rd Street between 1904 and 1907. Of the essentially six slips that made up adjacent but separate terminals, the Jersey Central operated one, the Erie two, and the Lackawanna three (Droege 1916: 141).

At the same time as the 23rd Street terminal construction, the Jersey Central also extensively altered its Liberty Street passenger and freight terminals. This work was completed between 1905 and 1907. Having established two modernized New York ferry docking facilities at Liberty and 23rd streets by 1907, the Jersey Central's engineering staff turned to the Jersey City terminal site.

By the turn of the century, the company provided 129 ferry boat movements per day each way between Jersey City and Liberty Street and 57 movements per day each way between Jersey City and 23rd Street. Two hundred trains daily entered and left the Jersey City terminal. The total number of passengers using the terminal daily was found by one day's count to be between 27,000and 28,000 in each direction (Railway Age Gazette 1914B: 860). In addition to the Jersey Central trains, which were mostly commuter runs, the Philadelphia and Reading, the Baltimore and Ohio, and, eventually, the Lehigh Valley railroads used these passenger facilities. The Jersey Central decided to enlarge the terminal substantially, reusing the head house but erecting new ferry and train sheds and concourses.

In its new plans, the Jersey Central was once again technologically progressive. In 1911, it built a new three-story railway express building along the south side of Johnston Avenue (see Figure G). The building was constructed of trabeated reinforced concrete sheathed with brick. Details of sills, lintels, and copings were also of concrete. The loading bays on the first floor along the street were raised to truck height and led through the building to a railroad siding north of the train shed. The upper two floors were occupied by the railway express offices.

To upgrade its ferry service, the Jersey Central converted its ferries from to two levels, which required the demolition of the 1889 ferry sheds and concourse and the erection of a new two-story

complex. Passenger traffic was thus segregated from vehicular movement. The four slips and the old bridges were retained, but a new concrete and steel structure was built overhead. Five, narrow, two-story buildings were located between the slips, containing waiting rooms for ferries, mail rooms, a baggage room, a newsstand, a drugstore, and a barber shop. Structural clay tile walls carried steel and concrete framing (see Figure C.|

In this new structure, concrete beams, girders, and slabs sat on wooden piles. The steel framing on the waterfront side was sheathed in copper--the four, low, elliptical arches articulated in a Beaux Arts style (see Figure H). Paired columns carried a full entablature, and a parapet wall, higher over the middle two arches and lower over the flanking two, capped the composition. Inscribed over the higher portion of the parapet, spanning the two central slips, was "CENTRAL R.R. OF NEW JERSEY." On the lower southern portion was written "READING LINES," and "BALTIMORE AND OHIO" appeared on the northern part.

The 75-by-348-foot lower concourse was paved with wooden blocks for the accommodation of heavy team traffic, which entered at either end (see Figure G). The upper, pedestrian concourse measured 50 by 302 feet, smaller than the lower level to allow the latter to be lit by skylights. Skylights also illuminated the upper level, which was embellished by a green and white glazed tile wainscot. Steel trusses supporting the ferry concourse roof were exposed. Ramps running along the north and south sides of the head house linked this second level of the ferry concourse with the new train concourse to the west. The 1889 main waiting room was joined here with a central stair. Pedestrian loading bridges were added to the ferry sheds, consisting in two bridges per slip with fixed western portions hinged to movable sections that were raised and lowered by 20-horsepower a.c. motors.

Ferry service continued while construction was taking place. The two northerly slips were built first, after which work commenced on the south pair.

To leave the central portion of the head house ground floor free for passage between ferry and train concourses, the renovators moved the main waiting room to the northern side of the building (see Figure G). This change freed the central area to function as a lobby, divided at the center by a new ticket office, checking room, and information, telephone, and telegraph booths. A new stairway at the east side led to the second level of the ferry concourse. Restaurant facilities took up the entire south side of

the head house ground floor. Railroad company office space lost to the new waiting room was relocated to the new express building. The new head house spaces were finished with tile wainscoting, plaster walls, ceilings on metal lath, and new skylights. The exterior and the upper floors of the interior remained the same.

The enlargement plan for the terminal facilities called for a new Bush-type train shed to be erected, inasmuch as the 1889 shed was obsolete after only 24 years of service. However, railroad traffic had to be maintained during both the demolition and erection. To dismantle the old gable shed, the company engineers devised a traveler, which allowed for the removal of each truss and section of roofing or glazing. The structure was completely removed between April and May of 1913, and passenger service continued without injury (Railway Age Gazette 1913: 115-16).

The still-standing Jersey Central train shed consisted of a reinforced concrete roof slab carried by steel girders and beams supported by cast-iron Ionic columns. The smoke vents over each track were tapered at the top, offering better protection from the weather and at the same time having a bottom opening wide enough to catch the locomotive gases. The skylights were made smaller than those of earlier Bush designs. Two lights over the platforms were 4 feet 7 inches wide, and the ridge light was 5 feet wide; they were installed in 24-foot sections. Rolled steel bars sealed with lead suppported the wire glass. Skylights were raised on concrete curbs in the roof slab. Drainage was carried within the cast-iron columns.

The train shed foundation rested on piles ranging from 50 to 90 feet long, and the reinforced concrete platforms were carried on concrete beams and girders over the pile-supported footings. Tracks were laid directly on the fill.

A new train concourse was erected in this period, structurally independent of the train sheds and head house. As built and restored, it is a rectangular space measuring 61 by 369 feet. Its north and south end walls are curtain walls, with steel sash and glass infill forming entry points with paired doors. Haunched steel bents span east to west and are stiffened in the longitudinal direction by steel trusses. Each bent is received by steel columns along the west side and by an 8-foot deep girder carried by columns along the east side. Purlins spanning between the bents carry a concrete roof deck. A central monitor with skylights extends for the full length of the concourse roof. A steel staircase along the east wall at the north end of this

space leads directly to the second story of the head house. New Hutchinson indicators located in front of each track within the concourse were considered modern for the period.

The renovation and enlargement of the passenger terminal proper, completed in 1914, greatly eased the handling of people, ferries, and trains. The transition from a gable to a Bush train shed increased the number of passenger trains that could be accommodated and reduced maintenance. The head house was altered to create larger public spaces on either side of a central lobby. Double-story ferry concourses and sheds allowed for segregation of vehicular and pedestrian traffic.

However, these functional advantages came somewhat at the expense of aesthetic considerations. The Peabody and Stearns head house was dominated on the water side by the new two-story ferry house. Although handsomely clad on its New York side, its other, less obvious parts were simply covered by corrugated metal siding. The new ramps, constructed of reinforced concrete alongside the head house, contrasted harshly with the brick and stone of the nineteenth-century structure. The integrated 1889 terminal had given way to a jumbled assemblage of disparate forms and materials.

Therefore, although the marine terminal complex was improved as a working placed by the 1912-14 remodeling, it was somewhat compromised architecturally on the ferry side by those same renovations. The Beaux Arts trend in the City Beautiful movement during the early twentieth century produced great terminals at Hoboken and in New York City--e.g., the Pennsylvania and New York Central terminals. Although the Jersey Central had embraced this architectural mode on its ferry shed facade, it did not carry the design far enough. The terminal thus survives as a twentieth century concept sandwiching a nineteenth century head house. Historically, both are significant.

5. Decline and Abandonment

Over the next 15 to 20 years, the Jersey Central transformed the South Cove into a completely modern railroad complex. The freight yards expanded to he south and contained a coal-handling facility at Pier 18 (1919; largest in existence at the time) and a dry dock operation for its extensive railroad navy at Pier 19. The passenger terminal yards were enlarged and rearranged. A new signal tower was constructed to house the interlocking machinery in the yards. A yard office tower was erected just west of the

signal tower. A power plant, located north of the terminal on Johnston Avenue, was part of the 1914 improvements. On the south side of Johnston Avenue, just west of the terminal, were located various storage and repair shops, including a Pullman servicing station. Also in this post-1914 period was built a modern mail building, just south of the head house. A simple rectangle framed in steel, this building was clad in brick.

In 1914, the Jersey Central constructed a new engine terminal at Communipaw, one mile west of the passenger terminal. The new facilities could handle as many as 300 engines per day and replaced two older such roundhouse facilities at Fiddler's Elbow and Communipaw (Railway Age Gazette 1914A: 1585). The 1914 complex at Communipaw consisted to two roundhouses--one with 34 and one with 32 stalls, a powerhouse, a machine shop, a blacksmith shop, a storehouse and office, a material storage building, an oil house, cinder pits, a coaling station, a sand storage facility, a roundhouse office and toiler facilities, engineers' lockers, and a telephone tower. Once again, the railroad company utilized the most current construction materials and methods of reinforced concrete. Here, the straightforward new design was aesthetically resolved with brick and glass infill between the concrete structures. This impressive complex of buildings and structures, without which the passenger terminal could not have served its functions so well, still stands in a deteriorated, abandoned state.

Railroad records for the 1910-20 period clearly show that the era of the American railroad was heading into a long decline. By 1908, the Hudson and Manhattan Railroad had completed the first railroad tunnel under the Hudson River. The Pennsylvania was not far behind with its monumental undertaking of Pennsylvania Station in New York and its extensive tunnels at Weehawken. By 1920, passenger service was in a decline. After the timely stimulus of World War I and the increased use of automobiles and trucks, personal transit was preferred over mass transit. Serious blows were given to rail/ferry operations by the opening of the great Hudson River vehicular crossings: the Holland and Lincoln tunnels and the George Washington Bridge.

By the late 1960s, the Pennsylvania and New York Central railroads merged into the Penn Central, and the Erie and Lackawanna joined forces. The Jersey Central was controlled by the Baltimore and Ohio. Exchange Place, Harsimus Cove, and Pavonia were abandoned and/or demolished. The Aldene Plan of 1967 proposed a major consolidation of passenger railroad facilities in New Jersey. Jersey Central's trains were rerouted to Newark and the Jersey City

terminal was abandoned; freight operations continued at Communipaw. The engine terminal was also abandoned in 1973.

Jersey City's economic health suffered accordingly with that of the railroads. Great expanses of waterfront property lay fallow, falling back to the city. By the mid-1970s, a new use for the South Cove site was envisioned. Liberty State Park, a great new urban state park and New Jersey's first such facility, would be created, with the Statue of Liberty always in sight and the old passenger terminal adapted for today's use.

II. THE FERRY PORTION OF THE CRRNJ MARINE TERMINAL

A. SIGNIFICANCE

The Central Railroad of New Jersey Marine Terminal in Jersey City, now part of Liberty State Park, is listed on the National Register of Historic Places. Its significance is both that it is a maritime rail/ferry terminal and that it was partially designed by the preeminent architectural firm of Peabody and Stearns.

As a rail/ferry terminal, it functioned as an interface between the two modes of transportation. Ferries docked along the Hudson River waterfront and trains ended their Jersey City and New York runs in the sheds at the opposite end of the complex. Concourses and the head house complete an ensemble of spatial and building components. As a rail/ferry terminal, all these elements tell the history of Jersey City's role as a railroad terminus. With the demolition of the Erie station at Pavonia and the Pennsylvania station at Exchange Place, the CRRNJ terminal in Liberty Park is the last great terminal in that waterfront city.

B. ARCHITECTURAL DESCRIPTION

Massing of the ferry portion of the waterfront complex consists of four basic forms (see Figures I, J, and K). The tallest form is that of the outer ferry sheds along the Hudson River, which rise slightly higher than the ferry houses and inner ferry sheds just west of the outer sheds. Moving westward, the two-story concourse is the next element in the composition. Finally, the one-story concourse abuts the head house. Height diminishes along this east-west axis, although the middle two components (ferry houses and inner ferry sheds and the two-story concourse) are nearly the same height.

The principal spatial components of the ferry portion of the Central Railroad of New Jersey Jersey City terminal are the concourses, the

ferry houses, the inner and outer ferry sheds, and the racks and pilings that define the four slips. The lower vehicular concourse extends the full width between the head house and the bulkhead (75 feet). The upper passenger concourse is narrower (50 feet) and is separated from the head house but adjoins the ferry houses and inner sheds. The five two-story ferry houses are spaced so as to form four inner ferry sheds between them. Here are suspended the vehicular ferry bridges and passenger gangways. Each outer ferry shed houses the machinery for raising and lowering these apparatuses and also covers the end of the ferry boat. The slips are formed by wooden pile and the ground-level concrete slabs of the five ferry houses.

The functional requirements of this riverside complex were basically four: (1) to channel vehicular movement; (2) to funnel passenger circulation and to accommodate passengers' comforts and needs; (3) to contain the various supporting services and operations of the railroad company; and (4) to house the loading and debarking activity of the ferry boats themselves.

Vehicular traffic entered principally from the northern end of the lower concourse at the end of Johnston Avenue (see Figure J). Some traffic could also enter at the southern end. A right-angle turn off the north-south axis of the concourse led to the four vehicular bridges contained in the inner ferry slips. These wooden bridges were divided into three lanes by four heavy timber trusses. The middle lane was wider than the flanking two, and iron gates controlled access to each lane.

Passenger traffic was placed above vehicular traffic in a separate enclosed concourse. Two east-west ramps, one on each side of the head house, linked the train concourse west of the head house with the upper passenger concourse. This system funneled eastward-bound pedestrians to the north and south ends of the west side of the upper ferry concourse. At the midpoint of this same west side, a monumental metal stair descended to the 1889 main waiting room, the principal space in the head house. Enclosed stairs were located along the east side of the upper concourse in the north central and south central ferry houses. These ascended from the lower concourse area. From the upper passenger concourse, ferry/rail travelers had access to the four inner ferry sheds at the upper level where a balcony joined two pedestrian ramps along the north and south walls of the ferry houses. From these ramps, adjustable pedestrian bridges, two per shed, connected with the upper level of the ferry boats.

Ferry passenger accommodations were located in the middle three (of the five) ferry houses. Waiting rooms with toilets were located in the

north central and south central ferry houses. The middle house contained a barber shop, druggist, and newsstand (see Figure J).

The two end ferry houses at this upper level contained various company offices, and the north end of the upper concourse was also enclosed for office space (see Figure J).

Located below, on the first level of the ferry houses, were various supporting facilities (see Figure 1). The middle house contained the company's mail rooms, stationery supply, and baggage rooms. Ferrymen used the north central and south central houses. Storage and maintenance shops were located in the two end houses at the first level, which also contained doorways opening to the north (Pier 2) and the south sides of the complex.

The outer sheds cover only the western end of the four slips, so as to shield the ferry bridges' activity and the machinery apparatus located high above the second level, near the roof structure. Only the western end of the ferry boat (a double-ended vessel) was actually housed within the outer shed.

The front (riverside) elevation along the Hudson River is divided into four elliptical arches which define the four ferry slips (see Photograph 16). This facade is framed in structural steel, mostly angles, and was originally clad in a Beaux Arts-style copper skin (see Figure H).

Concrete caps on wooden piles form a concrete base for each of the five piers from which the arches spring. This concrete base is formed with a scotia profile (see Photographs 18 and 19), which received the paired columns formed in copper that clad each pier structure. A full entablature block was carried by each column pair. Above the entablature, a parapet, higher over the middle two arches and lower over the flanking two, capped the entire composition. Inscribed over the higher portion of the parapet, spanning the two central slips, was "CENTRAL R.R. OF NEW JERSEY." On the lower southern portion was written "READING LINES," and 'BALTIMORE AND OHIO" appeared on the northern part. All copperwork was removed before January 1981.

The steel framing consists principally in angle shapes. The paired columns are laterally supported by Warren trusses at their lower levels (see Photograph 18) and are thereby tied back to each east wall of the ferry houses (see Photograph 34) where the trusses are joined to the supporting plate girder of the second floors.

The southern elevation (see Photograph 17) is clad in corrugated metal siding, except for the open lower vehicular concourse and the open sea

end where the copper was removed. The south ramp conceals the roof end of the one-story concourse. The upper passenger concourse, with its gable form, is arranged symmetrically in two window bays. The ferryhouse is pronounced by four bays on each level. On this south side, the ferry house actually extends into the outer ferry shed, as is indicated by the additional windows on the second level of the south elevation. The return on the corner piers is at the extreme east end. On the second level, the passenger concourse is joined to the end ferry house by a vestibule that juts out at the intersection of the two.

The north elevation (see Photograph 20) is similarly disposed in its composition, although the corresponding ramp was removed before January 1981. The upper concourse has additionally two narrow windows, here located in the middle of the main two (see Photograph 21). First-level bays of the ferry house have doors that opened onto Pier 2, which ran along the north side of the ferry portion of the complex. Demolition of the north ramp has revealed the north end of the single-level concourse (see Photograph 22), which connects the 1889 head house with the double-level concourse. Its removal permitted the opening of windows onto this open area on the second level. At the midpoint, the bridge linking the main stair with the upper passenger concourse can be seen.

The desirability of creating a reasonably unobstructed lower vehicular concourse led to an interesting structural system design (see Photograph 23). The framing system for the lower, one-story concourse differs from that supporting the upper passenger concourse. Three lines of steel columns define the two 25- and 50-foot widths of the concourses at the lower level. Columns along the easternmost line are actually engaged into the walls of the ferry houses. The middle three houses have columns at each corner and one at the middle of the wall, spaced 20 feet apart; the end houses have two columns, one at each corner. The inner sheds are unobstructed by columns. Each span across from ferry house to ferry house is divided in half (each 25 feet), with the center point hung from the structured of the upper concourse above. Similarly, the line of columns separating the 25- and 50-foot concourses at the lower level alternate between column-supported and hung connections. The main girders span 50 feet in an east-west direction between these two rows. Each 20- or 25-foot bay is divided into eight components by smaller steel beams spanning between these girders and supporting the concrete slab of the upper passenger concourse (see Figures L and M).

These smaller beams are eliminated at the one-story lower vehicular concourse because it only supports a roof. This roof has a monitor skylight extending along the middle of its length, broken at the center

by the bridge connecting the main stair to the upper passenger concourse.

The west wall of the lower vehicular concourse is the exterior brick wall of the 1889 head house. Its east wall alternates between the hollow terra cotta tile infill of the ferry houses and the four open inner ferry sheds. The north and south ends are open. The slab of the upper floor is turned down on the girders and beams and yields a concrete ceiling below. The ground-level vehicular concourse was originally paved with wood blocks; later, asphalt was spread over much of its surface area.

Each lower level slip is defined on either side (north and south) by the hollow terra cotta tile walls of the ferry houses. Access to the wooden vehicular bridges is controlled by a set of iron gates located at the bulkhead line. These gates are hinged on two posts (nonstructural) which define the tbree lanes of the bridges. One gate each covers the outer lanes where two sections swing in to cover the center lane. Each of the wooden vehicular bridges are formed by four trusses of heavy timber construction. These are purported to date from 1889, recycled in the 1913-14 remodeling.. Iron rods, through-bolted to the top and bottom chords, augment the heavy timber struts (see Photograph 24). Arched plate girders perforated with quatrefoil cutouts form tie beams between the end and inner trusses, restricting the height clearance in the outer lanes (see Photograph 32).

The two-story inner ferry sheds are spanned by three steel Warren trusses of angle sections and gusset plates. These spans between the steel columns engaged in the walls of the adjacent ferry houses. Purlins spanning east to west between the trusses carry the roof. Each shed contains two rectangular skylights (see Photographs 24 and 32).

The upper-level pedestrian gangways are supported by overhanging girders, which support the second-floor slab, and hangers, which are suspended form the trusses above. Like all of the second floor, these gangways are concrete slabs which are revealed on the outside of the paneled railings. These are infilled above the slab with corrugated siding. The movable outer portion of each pedestrian bridge is hinged to the fixed portion. The outer section is steel framed and has a wooden floor rather than the concrete slab.

The lifting apparatus for both the wooden vehicular and steel passenger bridges is powered by drive shafts that run east-west and are located in the uppermost area of the outer ferry sheds. Counterweight towers (see Photograph 25), which flank either end of the vebicular bridges, not only contain the counterweights but also carry three plate girders that

span across the bridges from tower to tower. Lifting rods are located at the ends of each of the four bridge trusses. They are hinged to fixed plates at the middle trusses and to movable cams on the ends. The rods are pulled by chains rising form the middle two rods to pulleys located between the plate girders. These chains connect with the rods on the outer trusses so that the lift on the middle rods is consistent with that on the end rods. Power for the lift is provided by the drive shaft located above each of the counterweight towers. Here, a powered pulley takes a steel cable that is connected to the counterweights at one end, rises to the pulley at the top of the tower, descends to another pulley on the bridge and rises again to a fixed connection with one of the plate girders (see Photograph 25).

Each of the steel pedestrian bridges is hung from a pair of chains on each side of the bridge (see Photograph 33). These are fixed to plates which are riveted to the outside of the floor girders. Each of these four chains rises to a separate winding drum located in the machinery area above the outer ferry shed. Two parallel power shafts are located along the north-south axis. The two drums taking the inner two chains (one on each side of the bridge) are located on one shaft, which also carries the matching two chains of the other bridge. The other shaft carries the outer chains, and this shafting is carried beyond the outer drums and terminates in a drum at either end. Here, the drums carry chains that run horizontally to pulleys located on either side of the outer structural piers which define the four ferry slips. From these outer pulleys, the counterweights for this upper pedestrian bridge system are hung (see Photograph 37).

The bridges were raised and lowered by 20-horsepower a.c. motors at a speed of about 7 feet per minute (Railway Age Gazette 1914B: 860). The locking devices at the end of the vehicular bridges which joined the ends with the ferry boats were manufactured by the A. & F. Brown Company of New York. The hinged (west) end of the vehicular bridges is connected to the outer end of a spring platform, which transmits the shock of impacts through heavy spring coils to a buffer platform. The buffer platform is separated from the concrete bulkhead by similar spring coils.

Along the ground level, the ferry houses contained supporting space for the railroad company and the ferry operations. The north end building provided maintenance shops that opened out onto Pier 2 (see Photograph 26). Groups of three windows were located in each structural bay opening onto the inner ferry shed. Paired and single doors of wooden construction are located in each of the bays along the north exterior wall (see Photograph 20). A one-story extension to this building is located at the east end. It is entered along Pier 2 on the north end

wall and has one window admitting light and air along this same wall (see Photograph 20). Internally, the north end ferry house contains a concrete floor, plastered walls, and an exposed steel frame and concrete slab of the floor above for a ceiling. The west end compartment is partitioned off from the rest of the space by a gypsum block wall (see Photograph 26).

The north central building contains an enclosed stair in its southwest corner which is entered from the concourse, a storage area opening onto the concourse, and ferrymen's quarters in the area east of these spaces (see Photograph 27). Shower and toilet rooms are located east of this main room. Access to the outer ferry sheds is beyond this building to the east. The main room has a concrete floor, exposed hollow terra cotta block walls, and the steel and concrete ceiling typical of the lower level of all the ferry houses. Wooden paneled doors and frames with transoms lead to the eastern rooms (see Photograph 27). White ceramic tile is used throughout on the wall surfaces of the toilet and shower areas. Windows, typically grouped in threes per each structural bay, admit light and air from both the north and south walls of the ferrymen's rooms.

On the first level, beyond the east end wall of the north central and south central ferry houses, is located a precast concrete shanty (see Photograph 34). These announcer's shanties were placed between the first and second and the third and fourth slips. These shelters are octagonal in plan and have an eight-sided roof as well. The east side contains a door and four sides have windows, all of wooden construction.

Railroad functions are located in the middle ferry building. These included the railroad company's mail room (see Photograph 28), baggage rooms, the stationer's room, and other storage spaces. The finish materials are typical of the previously-described elements. Built-in cabinets and bins of wooden construction are located throughout the mail and stationery rooms.

The south central ferry house functioned as did the north central one, in that it was occupied by the ferrymen. An enclosed stair opening onto the concourse is located in the southwest corner. An elevator shaft is located just east of this stair. The stairway was floored over on each level and the elevator removed at some later date. A storage room is located in the northwest corner of this building. Otherwise, the ferrymen's quarters are located within one large open room opening to the outer ferry sheds. Another announcer's shanty is located beyond the east wall.

More storage and maintenance shops were situated in the south end building, which has finished surfaces typical of the other houses. An eastern extension to this house has an irregular form corresponding to the plan of the concrete slab that defines the ferry slips in the outer sheds.

The upper level of the ferry portion of the marine terminal had five points of access. Two were the enclosed stairs already mentioned in the north and south central ferry houses, which essentially linked the two levels of the concourses. A third was the monumental steel staircase, which rises from the main 1889 waiting room to a landing contained within the bridge connection at the middle of the single-level concourse. This bridge adjoins the second-level passenger concourse. The steel stairway (see Photograph 30) has a glazed green tile wainscot with plastered walls and ceilings above. The landing was skylighted, and light was also admitted by way of windows above the wainscot along the south wall. On the north side are two doorways: the western opening leads back to the second floor of the head house; the eastern opening leads to a small room that adjoins and opens onto the upper concourse. Five doors with transoms along the east wall lead directly from the landing to the passenger concourse.

The two other points of access to the upper level of the terminal's ferry portion were the ramps linking the north and south ends of the train and ferry concourses. At the time of this recording, the north ramp had been removed; therefore, only the south ramp has been documented. The floor and roof steel beams span transversely across the ramp from concrete wall to concrete wall. The roof is open in alternating bays for skylights. The floor is a concrete slab. The walls are plastered, and a lower wainscot is defined by a high rail.

The upper passenger concourse is a long rectilinear hall which is open except for the north end where offices were created in the end bay. The length of the concourse is divided into 14 structural bays which alternate between paired 20- and 25-foot spacings, creating a subtle irregular rhythm. The structure is articulated by square piers in a row down the center of the space and by pilaster strips along the east and west walls. These vertical members are capped with plaster Tuscan capitals, and the shafts of the piers and pilasters are still columns clad in plaster. The lower glazed green tile wainscot is carried across the pilasters and wraps around all sides of the piers. Modified steel Warren trusses span from pilaster to pier to pilaster across the width of the space. The top chords are sloped to form the pitch of the concourse roof. Lattice or double-intersection Warren trusses span between the center line of piers in the longitudinal direction. Above this area, a continuous skylighted monitor is raised at the midpoint,

corresponding to the middle two panels of the transverse modified Warren trusses. Light is entered at each of the north and south end walls and along the west side. The floor is a concrete slab, and the walls are plastered except for the continuous glazed green tile wainscot. Panels are created with plaster moldings in the wall areas between the trusses along the east and west walls. The ceiling is also plastered.

Offices in the northern end of the concourse were created by a wooden panel partition, having a continuous transom above and a paneled wainscot area just below the ceiling.

The inner ferry sheds on the second level are each reached by two sets of sliding pocket doors from the concourse (see Photograph 32). An intermediate balcony area leads to the sloping passenger gangways on either side. These, in turn, are joined to the movable passenger bridges at the eastern ends. The modified steel Warren trusses which span these spaces are laterally braced by lattice or double-intersection Warren trusses at their mid-span and along the walls of the ferry houses (see Photograph 32). These walls, like those on the first level, are of exposed structural hollow clay tile. Steel columns divide the walls into four bays, each of which contains a group of three double-hung windows of wooden construction. The sills are concrete, and a concrete beam, on which rests the lattice or double-intersection Warren trusses, forms a continuous concrete lintel for all windows in the four bays. The panels of the lattice trusses atop this concrete beam are infilled with concrete (see Photograph 32). The west wall between the shed and the concourse is of exposed tile.

Railroad offices occupied the north and south end buildings on the upper level and were the most finished spaces in the ferry houses (see Photograph 35). The concrete slab is covered with linoleum sheets and vinyl tiles. Walls and ceilings are plastered, and a wooden base and chair rail forms the stool and sill for the exterior windows. Paneled doors with transoms and wooden frames appear throughout these two buildings. The ceiling meets the wall in a cove plaster cornice, which is set off from the wall proper by a continuous picture molding.

In each of the north central and south central buildings are located the ferry passenger waiting rooms, presumably segregated according to sex, each with separate toilet facilities. Both contain enclosed stairways to the lower level. The south central waiting room contained the hoistway or elevator shaft, subsequently floored over. The spaces are skylighted, and windows on the north and south sides admit light and air from the adjacent areas of the inner ferry sheds (see Photograph 36). Subtle differences exist between the two waiting rooms,

probably owing to the fact that the two northern slips, houses, and sheds were constructed first, while the southern two remained in operation. For example, the north central waiting room has a wooden floor over the concrete slab and a chicken-wire plaster lath; its southern counterpart has a concrete slab and expanded metal plaster lath. Walls are simply plaster, as are the ceilings; the wall base, door, and window trim are of wood.

The middle ferry building on the second level contained passenger services, which included a newsstand and barbershop in storefronts facing the concourse (see Photograph 31), and a drugstore in the eastern end of the building.

III. BIBLIOGRAPHY

A. WORKS CITED

Atlas of Jersey City, New Jersey from Actual Surveys and Official Plans Under the Direction of L.D. Fowler, Surveyor

1887 C.M. Bromley & Co., Philadelphia.

Berg, Walter G.

1904 *Buildings and Structures of American Railroads.* John Wiley & Sons, New York.

Condit, Carl W.

1968 *American Building.* The University of Chicago Press, Chicago.

1980 *The Port of New York.* The University of Chicago Press, Chicago.

Droege, John A.

1916 *Passenger Terminals and Trains.* McGraw-Hill Book Company, Inc., New York.

Engineering News

1914 Methods of Filling and Dredging for a Jersey City Terminal. Vol. 72, No. 25, pp. 1216-18.

Grundy, J. Owen

1976 *The History of Jersey City.* Progress Printing Co., Inc., Jersey City, N.J.

HCI

1977 *Cultural Resources Reconnaissance, Liberty State Park.* Historic Conservation and Interpretation, Inc., Newton, N.J. Report prepared for Geddes Brecher Qualls Cunningham and the N.J. Dept. of Environmental Protection.

HCI

1981 *A Reuse Plan for the Central Railroad of New Jersey Marine Terminal, Liberty State Park, Jersey City, New Jersey.* Historic Conservation and Interpretation, Inc., Newton, N.J. Report prepared for the Bureau of Capital Planning and Improvements, N.J. Dept. of Environmental Protection, Trenton.

McLean, Alexander

1895 *History of Jersey City, N.J.* The Jersey City Printing Co., Jersey City, N.J.

Railway Age Gazette

1913 An Economical Traveler for Dismantling a Train Shed. Vol. 55, No. 3, pp. 115-16. New York.

1914A Jersey Central Engine Terminal at Communipaw. Vol. 56, No. 26, pp. 1585-87. New York.

1914B The Jersey City Passenger Station Improvements. Vol. 57, No. 19, pp. 860-64. New York.

Rutsch, Edward S., and Herbert J. Githens

1980 *Stage IB Cultural Resources Survey of the Hudson County Sewerage Authority's Proposed Sewerage Treatment Facilities at the Jersey City East Treatment Plant, Jersey City, Hudson County, N.J.* Report prepared for Havens and Emerson, Inc., Saddle Brook, N.J. and Hazen and Sawyer, Inc., New York, N.Y. by Historic Conservation and Interpretation, Inc., Newton, N.J. July.

Sanford, Cynthia H., and Eileen M. McMahon

1976 *August Will: Scenes of Old Jersey City.* Catalog for an exhibit between Oct. 5 and Dec. 30. Jersey City Library Museum, Jersey City, N.J.

Shaw, William

1884 *History of Essex and Hudson Counties, New Jersey.* Vol. 2. Philadelphia.

The Railroad Gazette

1889 New Station and Interlocking at the Jersey City Terminus of the Central Railroad of New Jersey. Vol. 21, June 28, pp. 422-23. New York.

Winfield, Charles H.

1874 *History of the County of Hudson, New Jersey ....* Kennard & Hay, New York.

1891 *A Monograph on the Founding of Jersey City.* The Caxton Press, New York.

B. WORKS CONSULTED

Anderson, Notter, Finegold, Inc.

1978 *Recycling Historic Railroad Stations: A Citizens' Manual.* U.S. Dept. of Transportation, Washington, D.C. Nov.

Central Railroad Company of New Jersey

1949 *Historic Highlights, 1849-1949.* April.

Coupler

1949 Historical Highlights: Jersey Central Lines. Special Supplement, pp. 6-20. April.

Cunningham, John T.

1952 *Railroading in New Jersey.* Associated Railroads of New Jersey.

1961 *Railroading in New Jersey.* Associated Railroads of New Jersey.

1966 *New Jersey: America's Main Road.* Doubleday & Company, Inc., Garden City, N.Y.

Eaton, Harriet Phillips

1899 *Jersey City and Its Historic Sites.* Women's Club of Jersey City, N.J.

Educational Facilities Laboratories and the National Endowment for the Arts

1974 *Reusing Railroad Stations, Book One.*

1975 *Reusing Railroad Stations, Book Two.*

Engineering News

1914 Methods of Filling and Dredging for a Jersey City Terminal. Vol. 72, No. 25, pp 1216-18.

Engineering News-Record

1920 Design and Operation of Modern Car-Dump Coal Pier. Vol. 84, No. 16, pp. 759-62.

Engineering Record

1905 The New Steel Ferry House of the Central Railroad of New Jersey. Vol. 51, No. 1, pp. 23-26.

1906 New York Passenger Terminal, Central Railroad of New Jersey. Vol. 59, No. 21, pp. 650-53.

Free Public Library of Jersey City

1909 *From Canoe to Tunnel: A Sketch of the History of Transportation between Jersey City and New York, 1661-1909.* Jersey City, N.J.

Heyer, Richard, and John Zec

1975 *Railroads of New Jersey.*

Kobbé, Gustav

1891 *The Central Railroad of New Jersey.* Gustav Kobbé Co., New York.

Lane, W.J.

1939 *From Indian Trail to Iron Horse.* Princeton University Press, Princeton, N.J.

Liberty State Park Planning Reports

1975 *Phase One Progress Report: Restoration of Jersey City Terminal.* National Heritage Corporation, West Chester, Pa. Mar. 3.

1975 *Program for Emergency Stabilization, Jersey City Railroad Maritime Terminal.* National Heritage Corporation, West Chester, Pa. Dec. 5.

1976 *Phase 1 Report: Structural Investigation of Terminal Buildings.* Thomas V. Dowd, P.E. Oct. 18.

1977 *Cultural Resources Reconnaissance.* Historic Conservation and Interpretation, Inc., Newton, N.J. Apr. 1.

1978 *Preservation, Restoration, and Adaptive Utilization Program: Main Waiting Room, Jersey City Terminal, Central Railroad of New Jersey.* National Heritage Corporation, West Chester, Pa. May 1.

McIntire, Frank

1949 The History of the Communipaw and Elizabeth Ferries from 1661 to the Present Time. *Proceedings of the New Jersey Historical Society*, Vol. 67, No. 1, Whole No. 256, pp. 22-40.

Map of the New York Bay & Harbor and the Environs

1846 C. & G.S. No. 37, Sheet 5 of 6.

Moody, John

1919 *The Railroad Builders*. Vol. 38 of *Chronicles of America*, Yale University Press, New Haven, Ct.

Muirhead, Walter G. (ed.)

1910 *Jersey City of To-Day* .... Jersey City, N.J.

New Jersey Department of Transportation, Office of Information Services

1975 *The Development of Transportation in New Jersey, A Brief History*. Trenton, N.J.

Payne, John C.

1909 Hudson County--Its Waterfront Development. The Historical Society of Hudson County *Bulletin* (papers read before), No. 5.

Platt, Herman K.

1973 Jersey City and the United Railroad Companies, 1868: A Case Study of Municipal Weakness. *New Jersey History*, Vol. XCI, No. 4, Whole No. 355, pp. 249-65.

Raciti, Sebastian J.

1968 *An Analysis of the Decline of the Jersey City Economy and an Evaluation of Proposals for Its Resurgence*. University Microfilms, Inc., Ann Arbor, Mich.

Railway Age

1919 The Jersey Central Is Building a Modern Coal Pier. Vol. 67, No. 9, pp. 388-92. New York.

Railway Age Gazette

1908 The Manhattan Terminal of the Central Railroad of New Jersey. Vol. 45, No. 23, pp. 1288-92. New York.

1911 Late News (Pier 7 Explosion). Vol. 50, No. 5, p. 259. New York.

1913 New Freight Pier at Communipaw, N.J. Vol. 54, No. 19, pp. 1023-25. New York.

1915 Reconstruction of the Jersey City Terminal Yards. Vol. 58, No. 15, pp. 787-91. New York.

Report of the Board of Engineers, Jersey City Development Plan

1920 Nov. 1. Jersey City, N.J., pp. 76-79.

Report of the Committee on Ferries and Wharves

1845 Jersey City, N.J.

Report of the Committee on Streets to the Jersey City Common Council ...

1865 Jersey City, N.J.

Richardson, William H.

1927 The Federalist Fathers and the Founding of Jersey City. Historical Society of Hudson County, N.J. *Bulletin*, No. 22.

Taylor, George Rogers

1951 *The Transportation Revolution, 1815-1860.* Vol. 4 of *The Economic History of the United States.* Holt, Rinehart & Winston, New York.

Van Winkle, Daniel

1924 *History of the Municipalities of Hudson County, New Jersey, 1630-1923*, Vol. 1. Lewis Historical Publishing Co., Inc., New York.

Westgard, A.L.

1905 *Atlas of the State of New Jersey.* Survey Map Co., New York, p. 17.

Winfield, Charles H.

1872 *History of the Land Titles in Hudson County, New Jersey, 1609-1871*, Vols. 1 and 2. Wynkoop & Hallenback, New York.

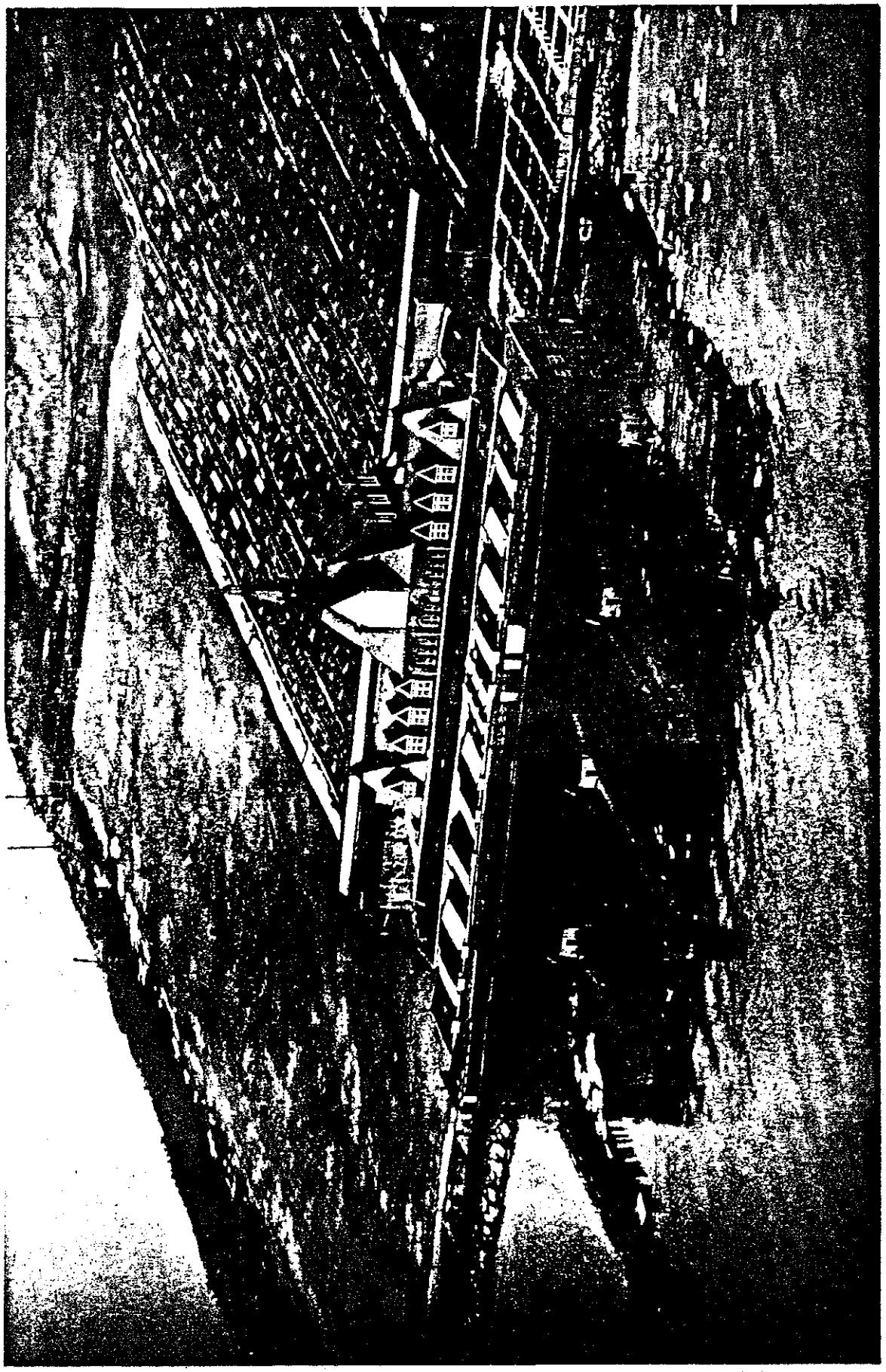


FIGURE A. View westward of the CRRNJ Maritime Terminal, Jersey City, New Jersey. (Michael Spozarsky, photographer, January 1981.) From the foreground: ferry slips, sheds, and concourses; head house; and train concourse and sheds.

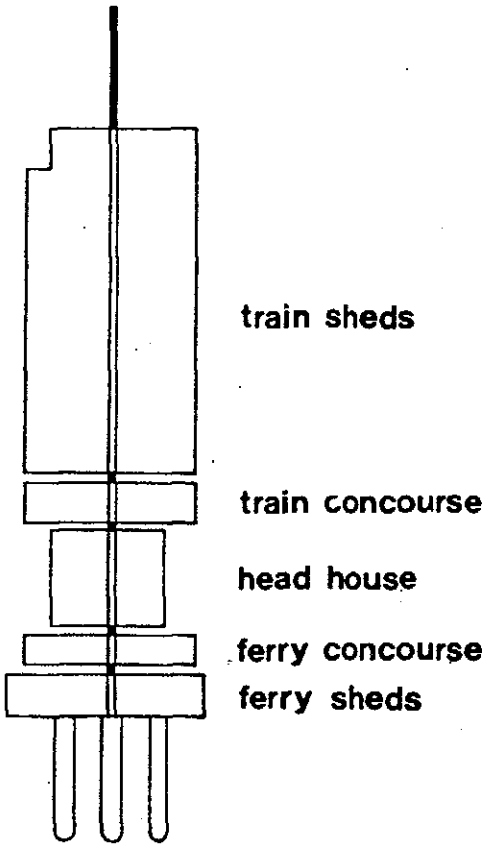


FIGURE B. Drawing of rail/ferry terminal spatial components.

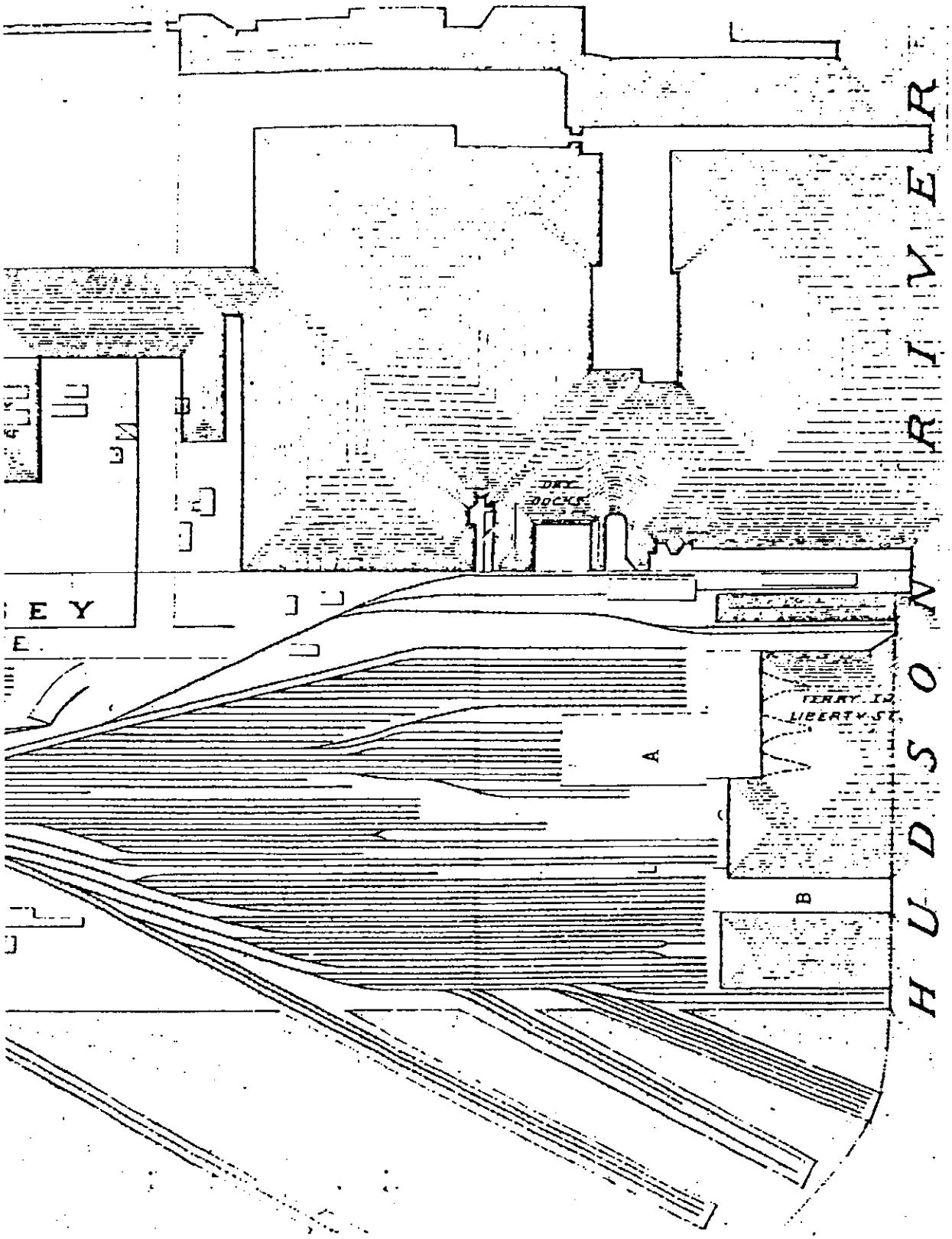


FIGURE C. Plan of CRRNJ passenger facilities before 1889 terminal (*Atlas of Jersey City ...* 1887: Plate V). The depot is labeled "A" and the covered pier "B."

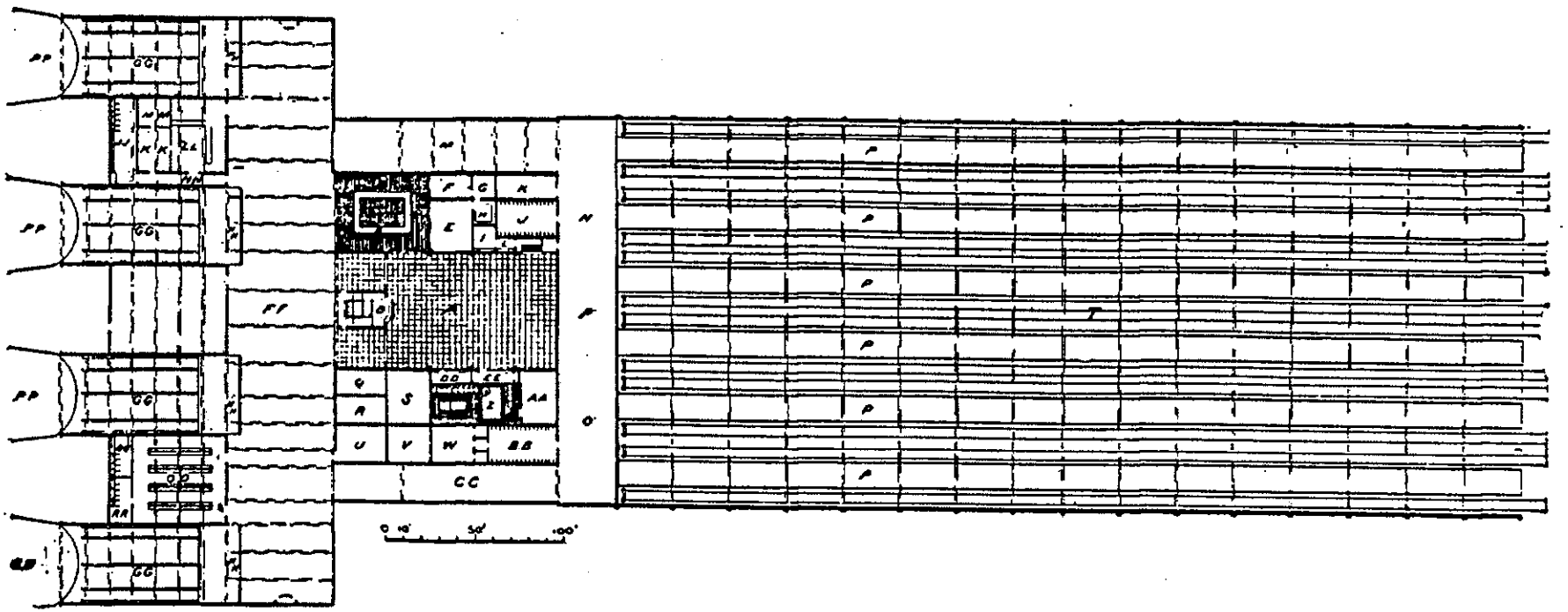


FIG. 679.—GROUND-PLAN.

A, Waiting-room.
B, Lunch-room.
C, Lobbies.
D, Ticket-office.
E, Dining-room.
F, Kitchen.
G, Stores.
H, Serving-room.
I, Telegraph.
J, Conductors' Room.
K, Truck.
L, Pullman.
M, Exit.
N, Inward Trains.
O, Outward Trains.
P, Platforms.
Q, Lost Articles.
R, Storage.
S, Men's Room.
T, Train-house.
U, Ferry Supt.
V, Baggage-master.
W, Depot-master.
X, Women's Toilet.
Y, Men's Toilet.
Z, Vault.
AA, Women's Room.
BB, Brakemen's Room.
CC, Baggage Passage.
DD, News-stand.
EE, Fruit-stand.
FF, Ferry-house.
GG, Bridges.
HH, Bumpers.
II, Sheds.
JJ, Men's Toilet.
KK, Kitchen.
LL, Restaurant for Train and Dock Hands.
MM, Stores.
NN, Passage.
OO, Emigrant Waiting-room.
PP, Ferry-slips.
QQ, Men's Toilet.
RR, Women's Toilet.

FIGURE D. Plan of 1889 CRRNJ terminal (Berg 1904: 433).

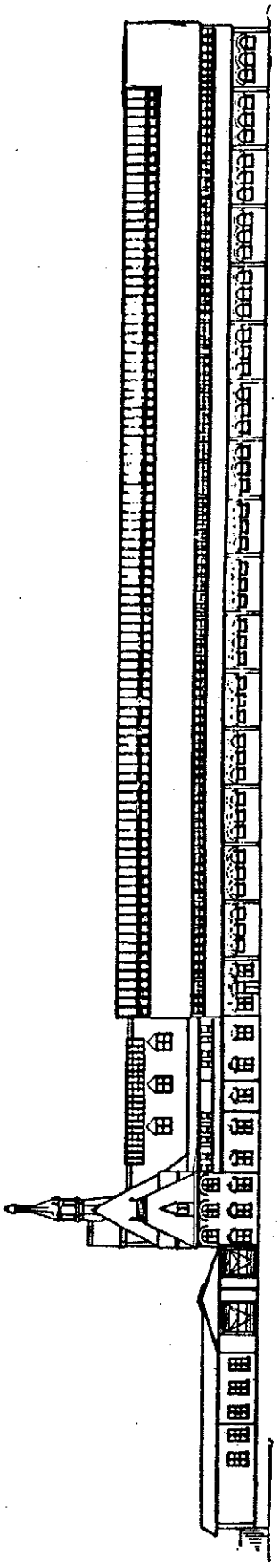


FIG. 680.—SIDE ELEVATION.

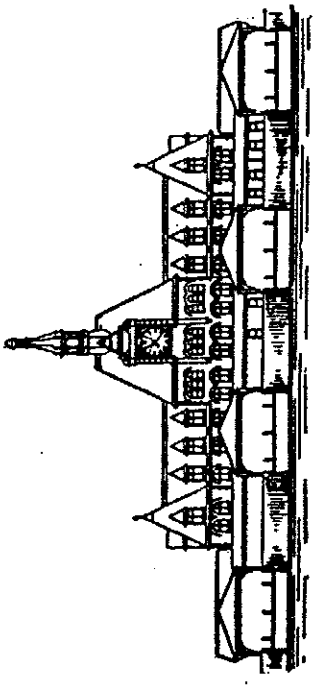


FIG. 681.—FRONT ELEVATION.

FIGURE E. Elevations of 1889 CRRNJ terminal (Berg 1904: 434).

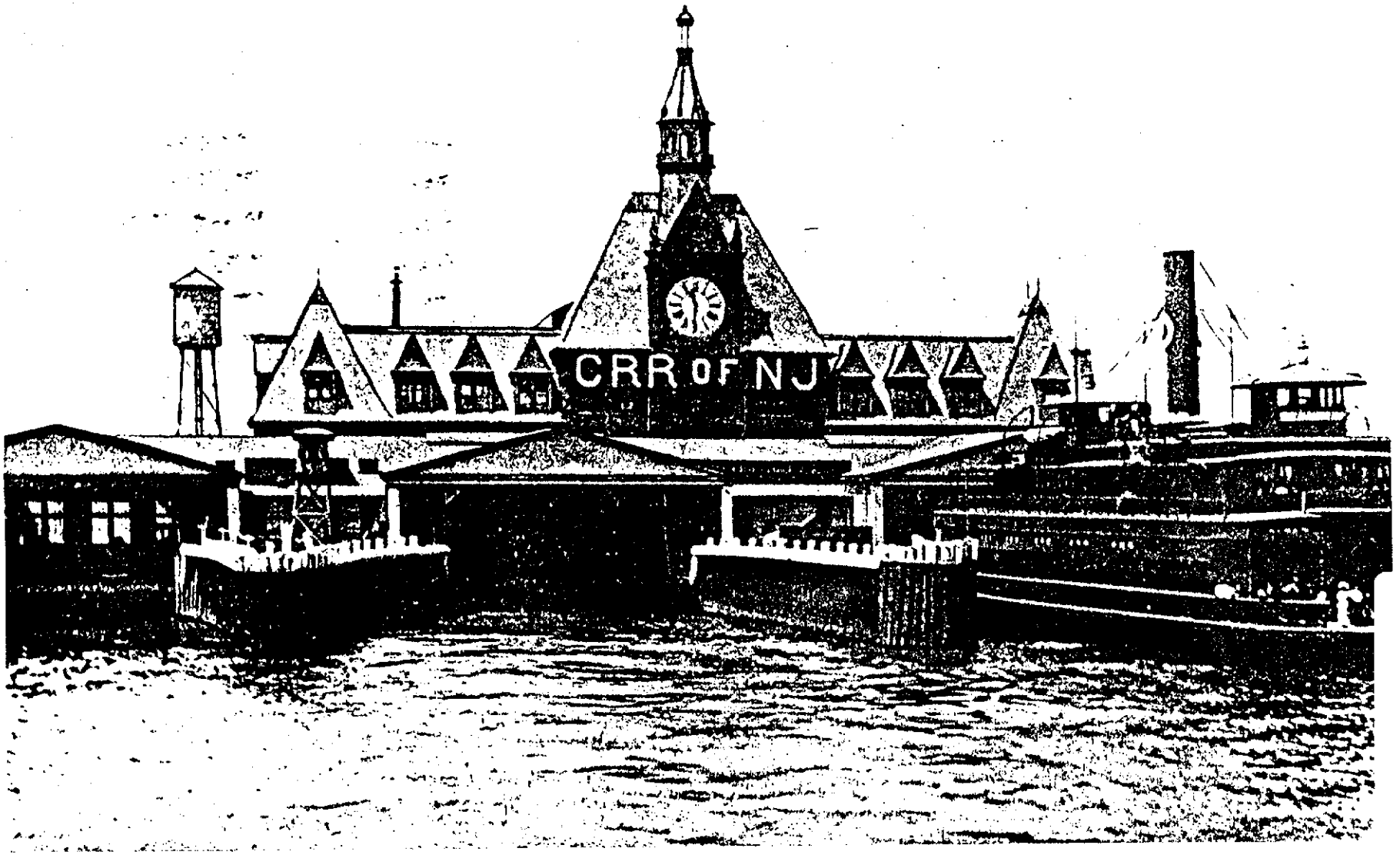


FIGURE F. View of the waterfront facade, 1889 CRRNJ ferry shed. (Courtesy of New Jersey Room, Rutgers University Library; copied by Michael Spozarsky, photographer, 1980.)

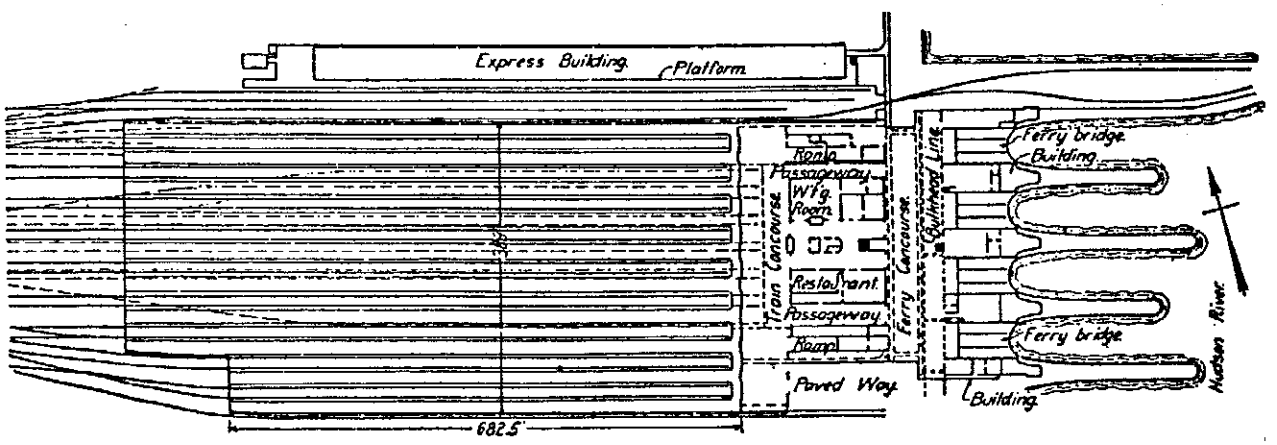


Fig. 104.—Layout of Jersey City Station, Central of New Jersey.

FIGURE G. Plan of 1914 CRRNJ terminal complex (Droege 1916: Fig. 104).

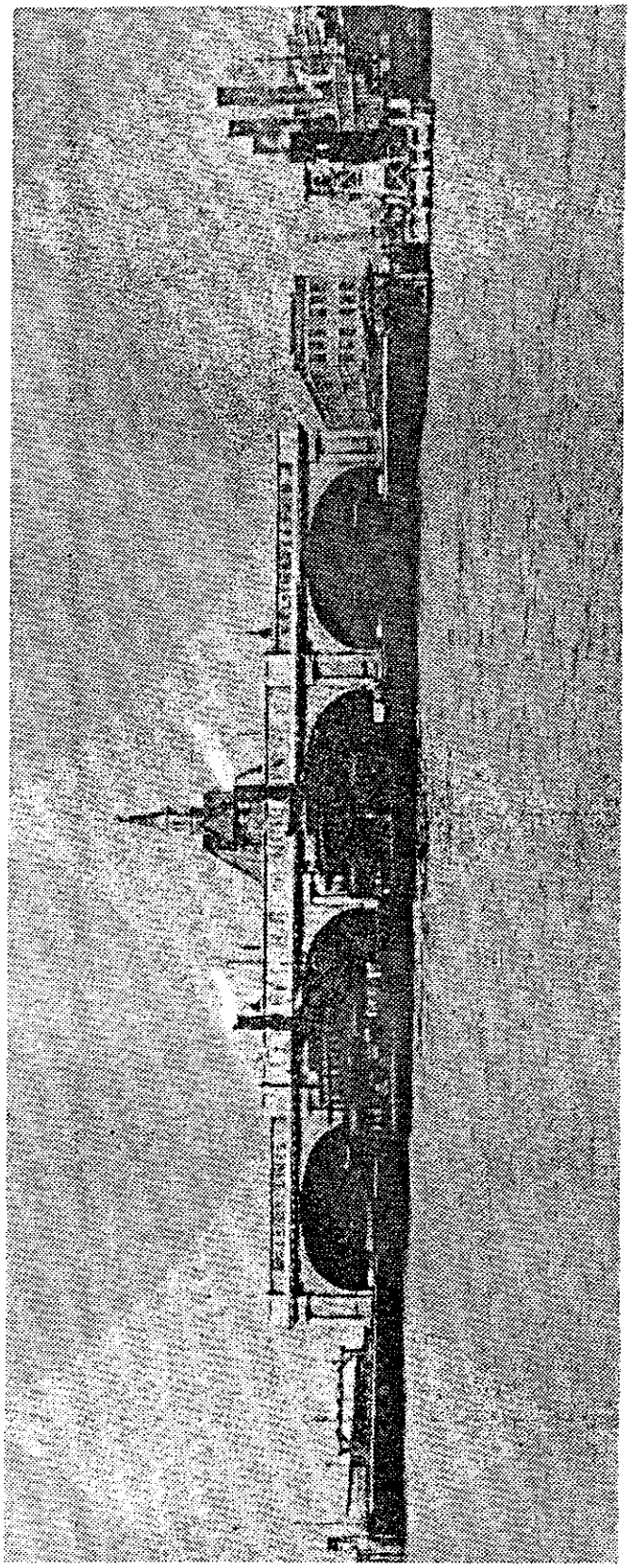
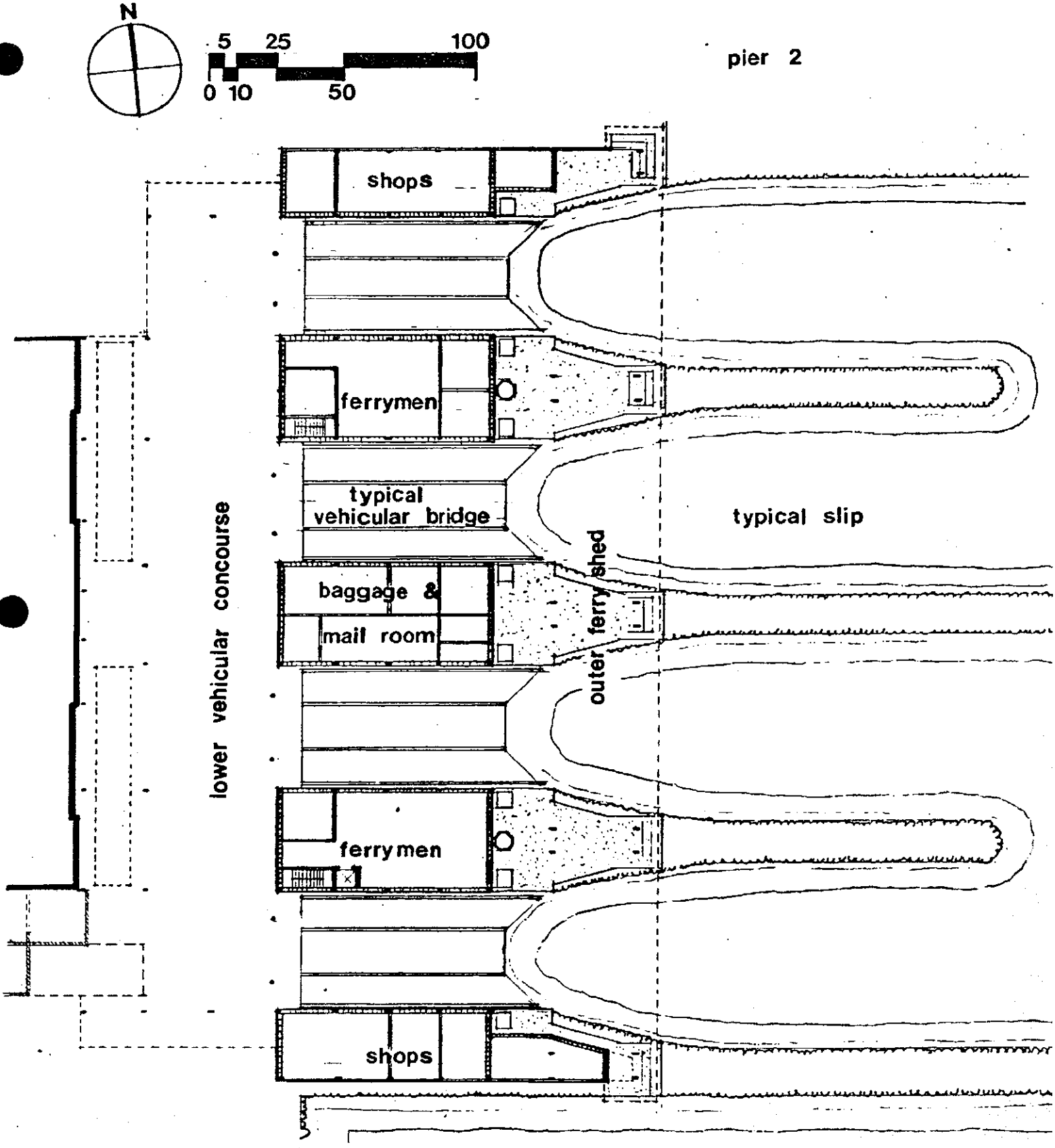
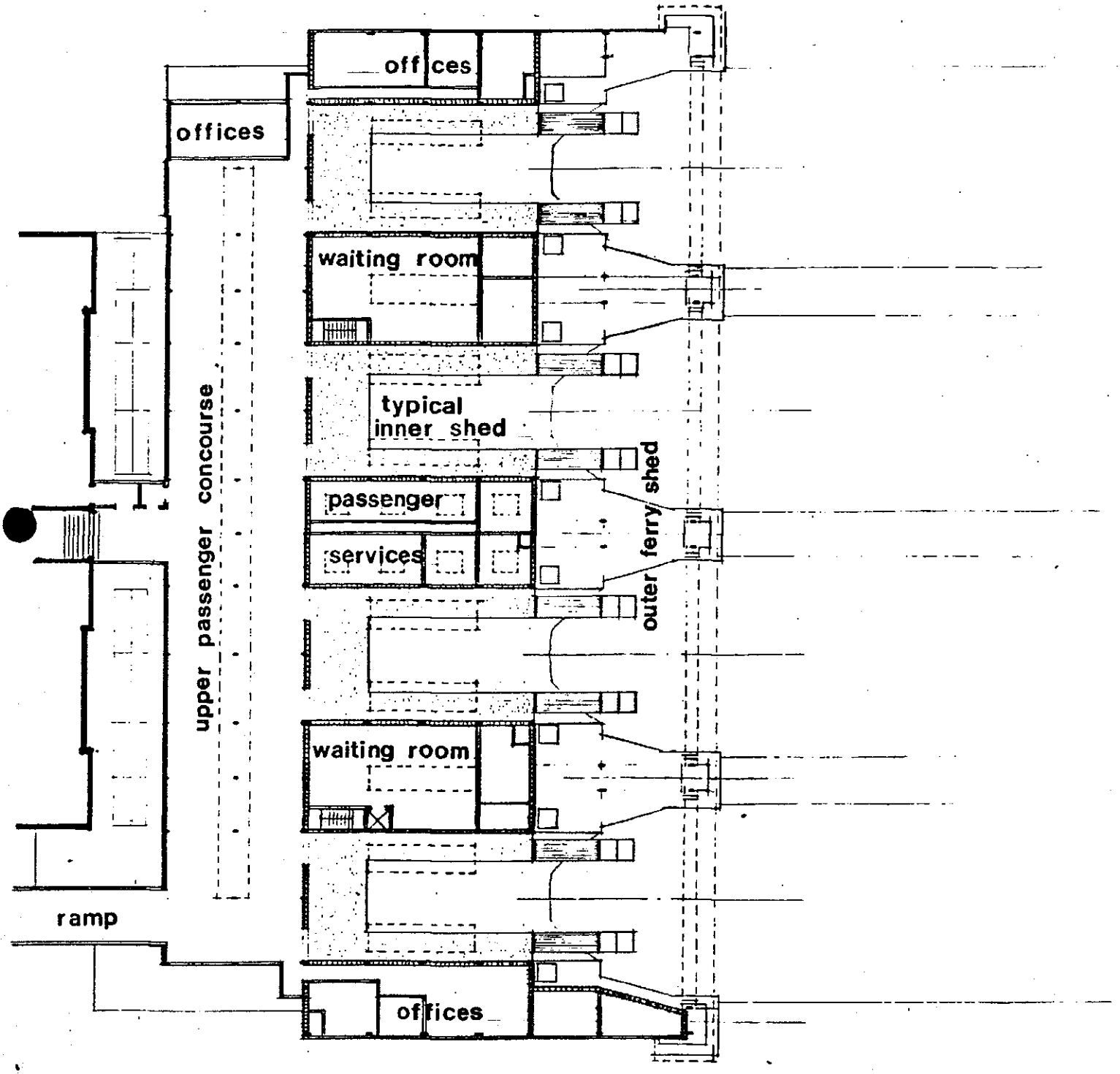


FIGURE H. View of the waterfront facade of the 1912-14 ferry shed, showing the Beaux Arts exterior. (Courtesy John Milner Associates, Inc.)



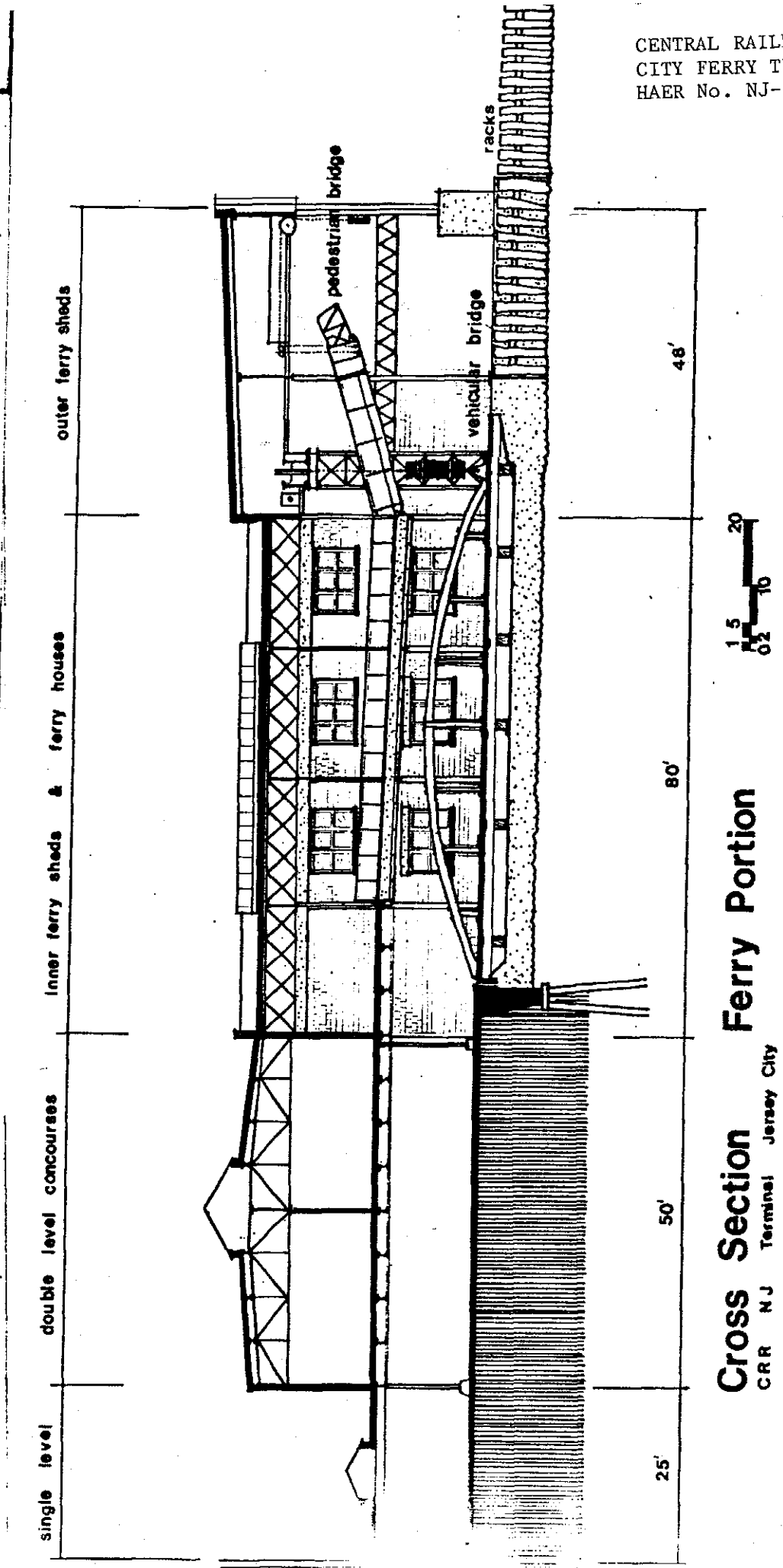
Lower Level Plan • Ferry Portion

CRR - NJ. Terminal , Jersey City , NJ. FIGURE I

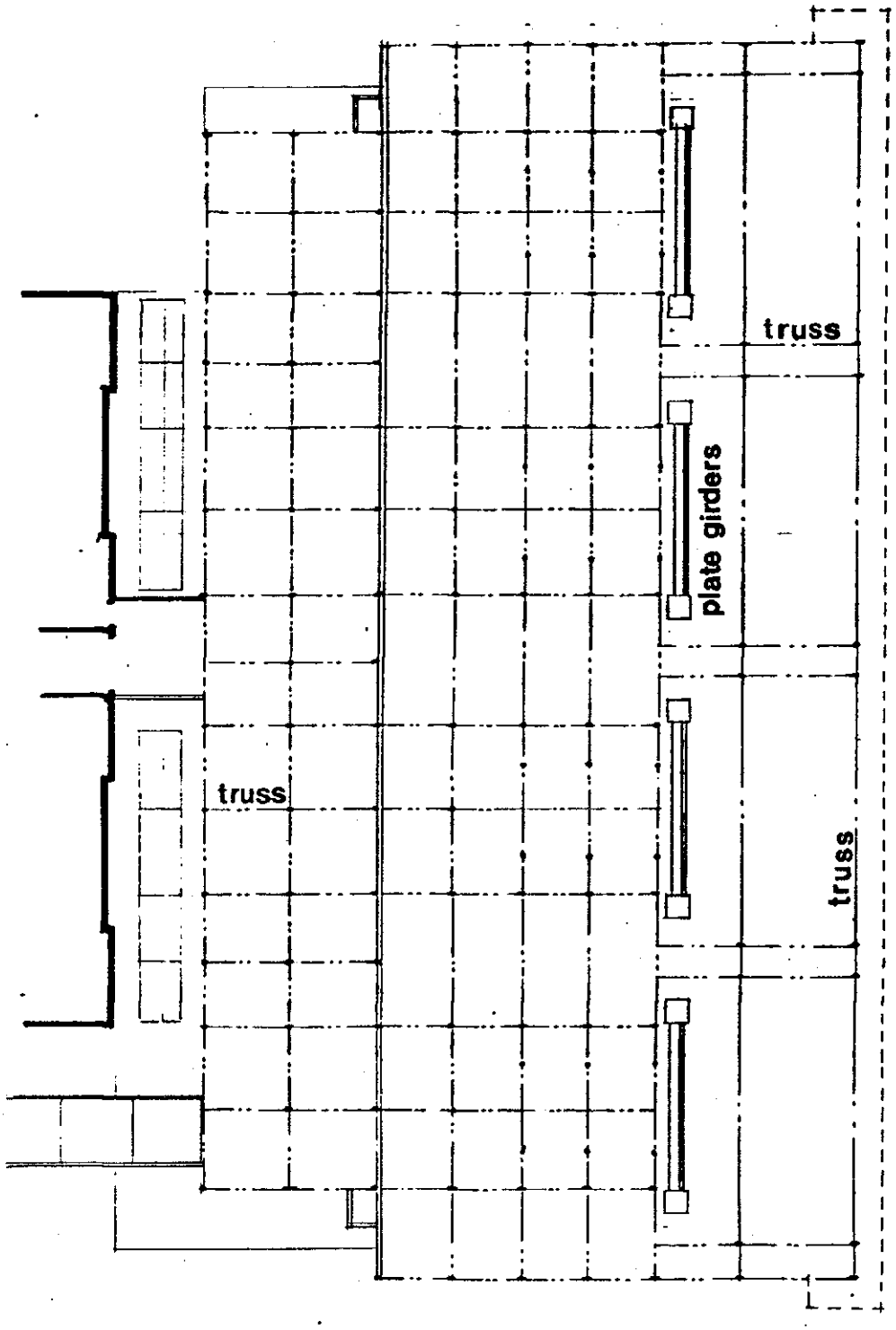


Upper Level Plan • Ferry Portion

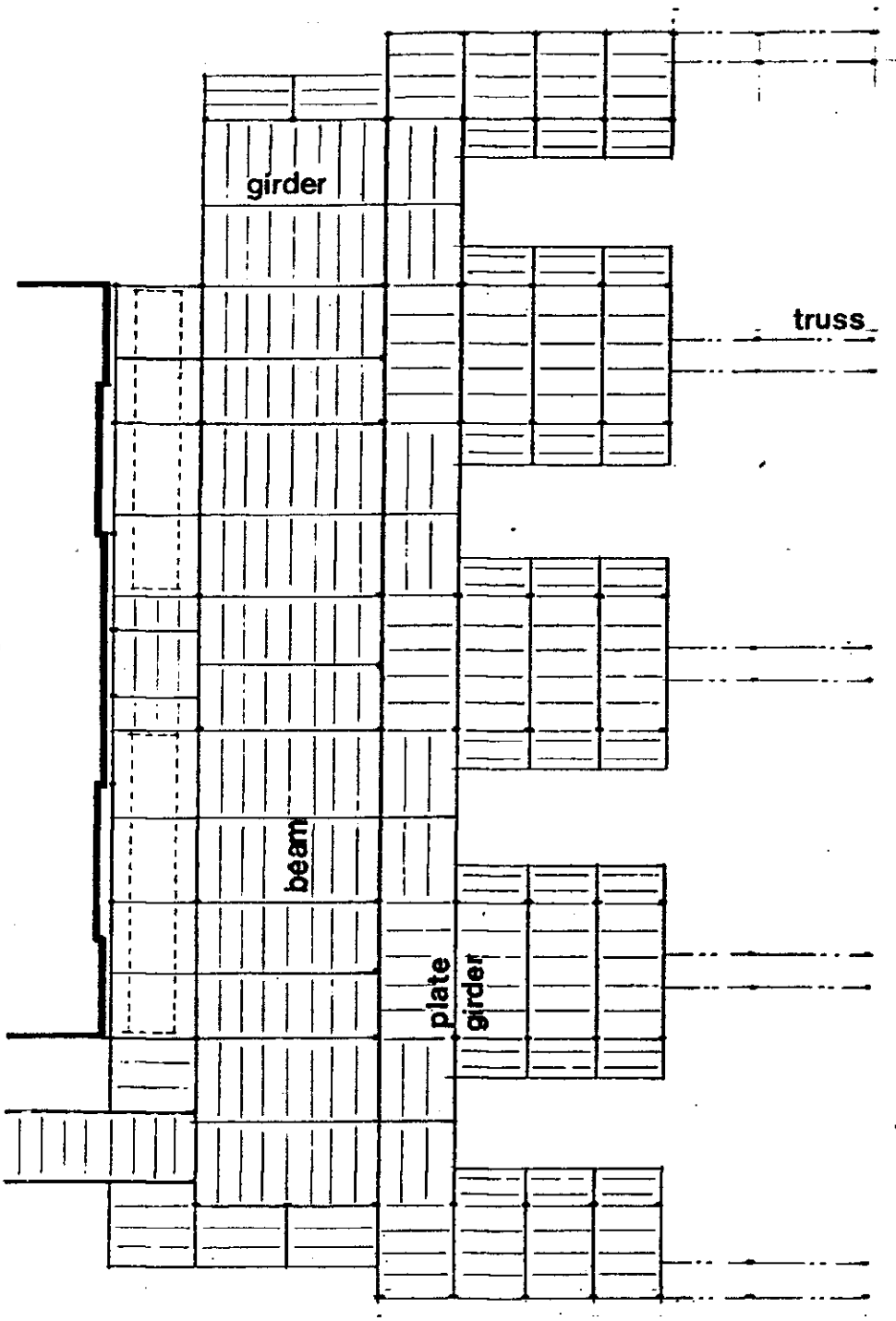
CRR - NJ. Terminal, Jersey City, NJ. FIGURE J



Cross Section Ferry Portion
CRR NJ Terminal Jersey City



Roof Framing • Ferry Portion
CRR - NJ. Terminal , Jersey City , NJ. FIGURE H



Upper Floor Framing • Ferry Portion
CRR - NJ. Terminal, Jersey City, NJ. FIGURE L